AUGUST 28, 1941

The IRON AGE

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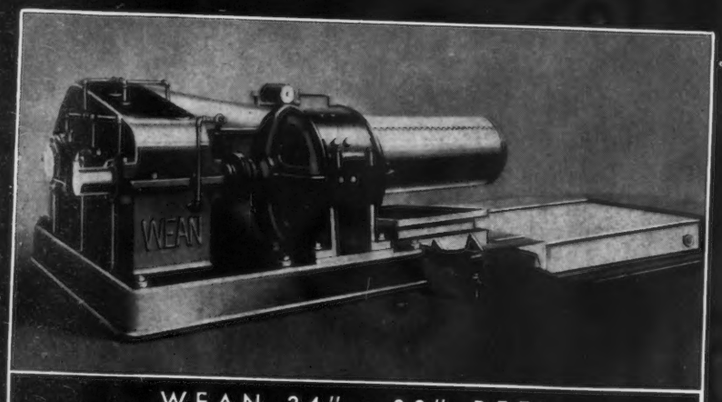

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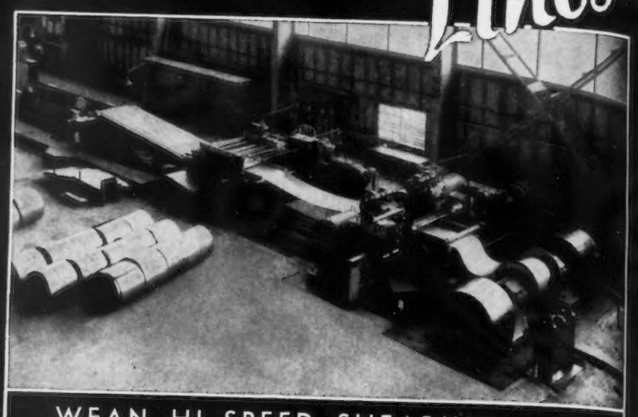

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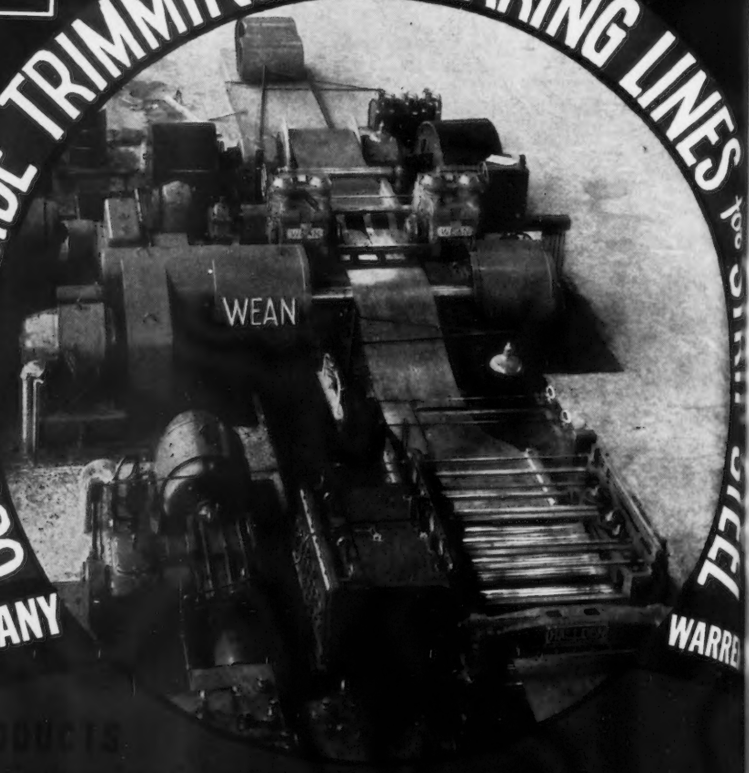
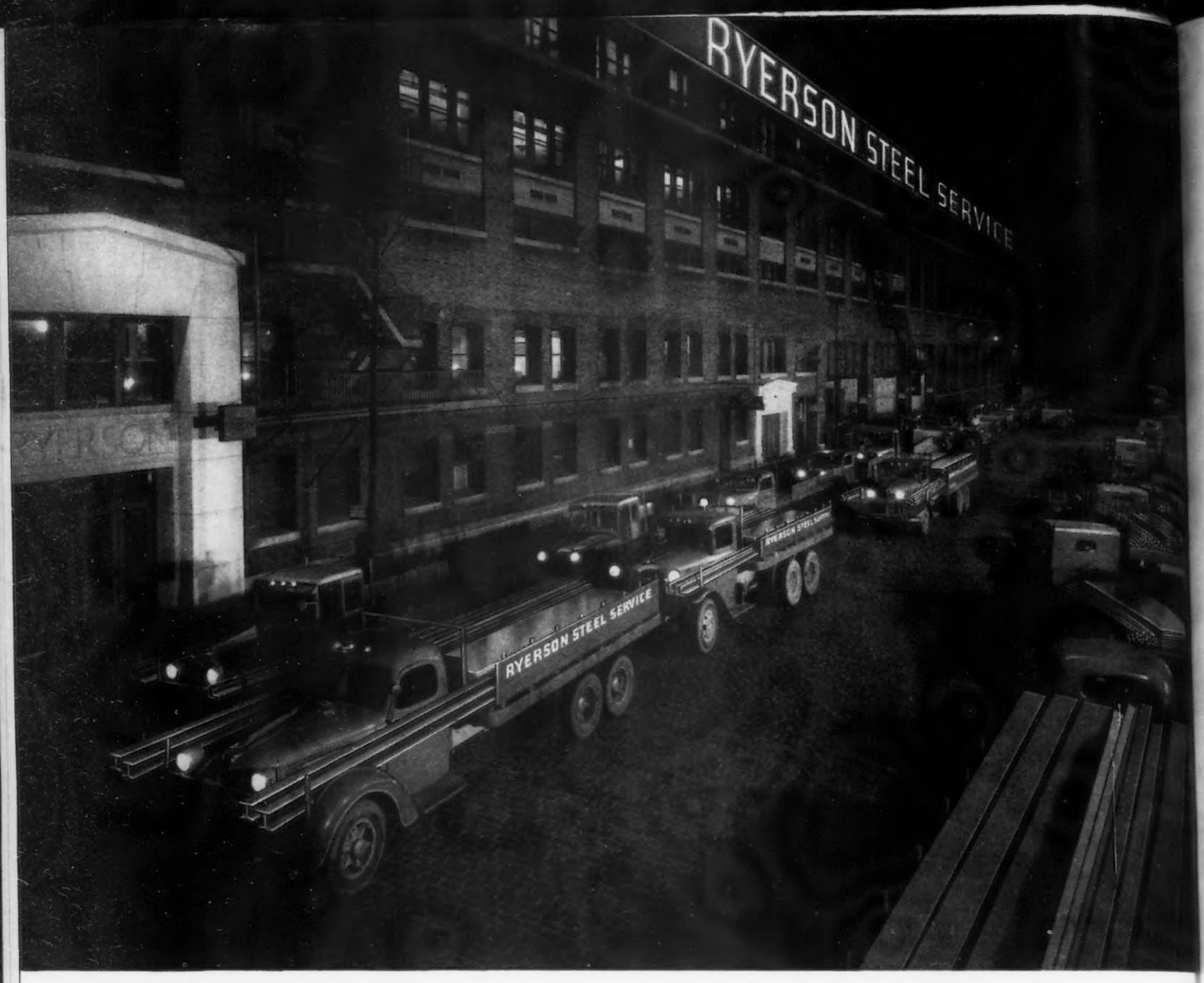


THE WEAN ENGINEERING COMPANY

WARREN

AUGUST 28, 1941
VOL. 148, NO. 9

This Week in . . . THE IRON AGE



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THE IRON AGE

AUGUST 28, 1941

ESTABLISHED 1855

Among the Four Freedoms

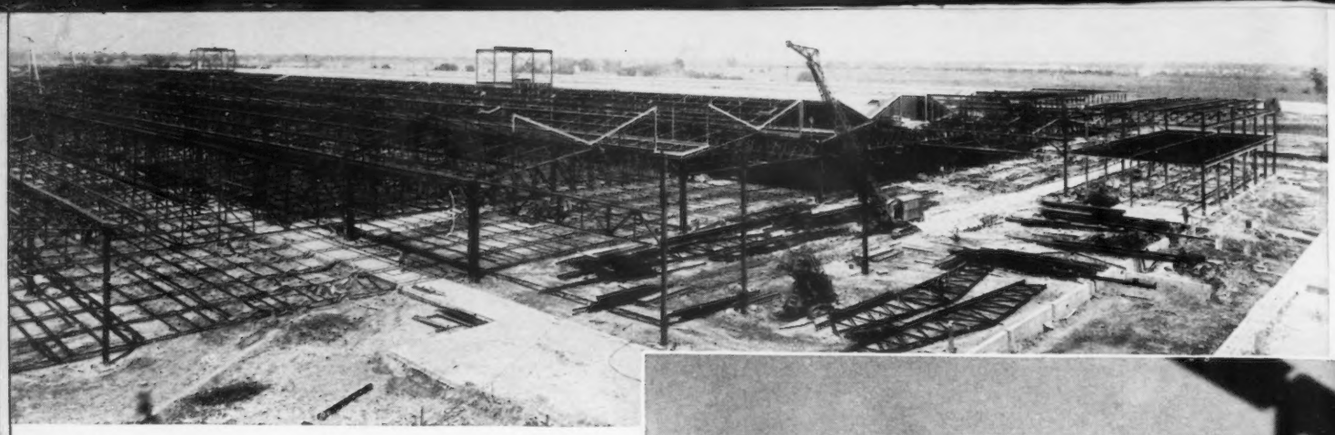
THE "four freedoms" which have been laid before us as the inalienable and unshakable foundations of democracy must surely include the right to change one's mind. Thus, in our anticipated state of personal liberty after we emerge from emergencies, one should be able to quit a golf club if he sees fit, leave the ranks of the Republicans and become a Democrat and even change his religion without incurring the risk of extreme penalties, at least in this world.

Of course, in a time like the present, one might well concede some limitations upon personal liberty, when individual mind changing impinges upon public welfare. Thus, our boys in the Army camps and in the Navy who decide to call it a day before their time is up are labled AWOL and are visited by afflictions when caught up with.

However, even in an emergency, our government is extremely liberal in its attitude toward mind changing on the part of citizens not in uniform, even though this may and does directly impede the defense program. A case in point is the strike at the Federal Shipbuilding & Drydock Co. Here, the Industrial Union of Marine and Shipbuilding Workers (CIO), after agreeing that there would be no more strikes until June 23, 1943, changed its mind and struck to compel the company to prevent union employees from changing *their* minds about continuing to belong to the union. The process of compulsion called for by the union bosses was the simple and effective one of having the company boot such mind changers out of the plant gates and tell them to seek employment elsewhere which, in effect, meant permanent excommunication from the right to work at the trade, for the shipbuilding industry is pretty well organized. And if anyone thinks that a backslid unionist could simply go to another shipyard and get a job as a non-unionist—and hold it—he does not know much about human, or inhuman, nature.

With such great principles at stake as the right of union leaders to change their minds and the "unright" of the rank and file of their membership to do so, the holding up of half a billion dollars worth of vitally needed warship and cargo ship construction for several weeks was quite inconsequential. For what is making the world safe for democracy compared to making America solid for the CIO?

J. H. Van Deventer



A thousand airplane motors a month will soon be streaming from Buick's new plant.

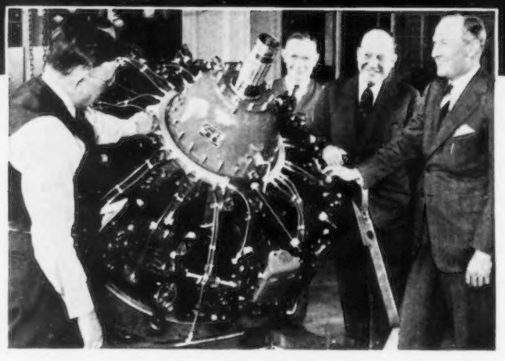
Steel from INLAND Helps Build Buick's Chicago Aviation Plant

Less than a year ago Inland was almost wholly engaged in making steel for normal commercial uses. Today, it is quite different. Inland with the same loyal spirit shown by the vast majority of industry throughout the country, is doing everything within its power to advance the Defense Program.

That is why Inland rushed from its mills more than 5,000 tons of steel for fabrication into buildings for Buick's Airplane Motor Works at Melrose Park, Illinois. This enormous plant, now nearing completion, will employ 10,000 workers who will machine, assemble, and test 1,000 Pratt & Whitney motors a month.

This is typical of many new and urgent demands for tonnage coming to Inland in a steadily increasing volume. Inland knows that National Defense is its No. 1 Job and its business is being managed accordingly.

However, after satisfying these needs we are, to the best of our ability, proportioning our remaining steel equitably among our many customers who are engaged in non-defense industries.



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Austenite Grain Size

—Effects, Manipulations, and Limitations

By ARTHUR E. FOCKE
Research Metallurgist, Diamond Chain & Mfg. Co., Indianapolis

MUCH has been written on grain size[1], grain growth[2], and their application to ferrous metallurgical problems[3, 4]. If any one person were to take the time to thoroughly study the material covered by these four references, there would be no reason to read the balance of this article. However, in this present emergency, many are called upon to consider the grain size problem and make decisions regarding it who do not have this information readily available. To provide such individuals with a working knowledge of this problem the writer presented a talk on "Grain Size" (on which this paper is based) before the Indianapolis Chapter of the A.S.M. this spring.

METALLURGISTS are inclined to be faddish; but their fads, unlike women's fashions, seem to run in ten-year cycles. Thus, in the '20's of this century, the stress was applied to analysis; in the '30's it became apparent that even with the analysis rigidly controlled, significant differences could be obtained and the austenite grain size was considered to be the important variable. It is too early to anticipate what the '40's may bring forth, but the present trend is toward a realization that neither the analysis nor the austenite grain size, *separately or together*, are completely sufficient and efforts are being made to base decisions on direct hardenability tests. This trend shows that metallurgists have progressed far enough to be able to consider the results of the previous grain size emphasis and determine, at least, in some measure, its proper place in metallurgical tests and specifications.

Basic Working Concepts

Cicero, in a letter to his son, stated that any proper discussion of a subject should be introduced by a series of carefully planned definitions. Proceeding in this manner: "grains" are defined as individual crystals in metals[5] and "crystals" are coherent pieces of matter of which all parts have the same anisotropic arrangement of atoms.[6] For practical purposes, it can be said that a grain of iron is composed of iron atoms essentially regularly arranged with respect to each other and that the only difference between individual grains is that their regular arrangements are differently oriented in space, so that when two grains are adjacent, there is a discontinuity in regular atomic arrangement across the boundary. The exact character of the boundary is as easy to argue about as the classic subject of whether the mortar between bricks holds the bricks together or keeps them apart.

As a practical working concept, the writer has found that the "amorphous grain boundary hypothesis" is very useful. It must be recognized that this concept is subject to many technical criticisms; so many, in fact, that Gillett[7] states, "Few people today believe in the existence of an unoriented layer at the boundaries—the amorphous theory appears to be quite wrong and therefore cannot be helpful." In spite of this definite condemnation, the writer still feels that this theory provides a useful working explanation of how grains grow and the following explanation is therefore based on this concept.

It is assumed that at the interface between the two grains, atoms

at the surface are pulled out of their regular arrangement by the opposing fields of force within each of the grains, and therefore along the boundary these atoms are essentially randomly oriented and therefore amorphous. It is also assumed that the force tending to hold the atoms regularly oriented is greater the larger the grain. It is perhaps useful to consider a liquid analogy.

If a small drop of mercury is detached from a pool on a flat surface and then pushed back into contact with the larger pool, it will always be reabsorbed. In no case will the small drop pull additional mercury from the larger pool.

In most metals at room temperature, the atomic vibration is not sufficient to permit the atoms in the boundary to move from their disorganized state into the lattice of the larger grain. However, at some higher temperature, the atomic vibration becomes great enough to permit this movement to take place and if the larger grain gains the atoms from the boundary, of course their place must be filled with atoms pulled out of the smaller grain. There are, therefore, two essentials for grain growth. First, grain size contrast. If all the grains are exactly the same size no growth can take place. Second, high enough temperature to permit the atoms to move from the boundaries into the larger grains.

In nature, it would be impossible to produce all the grains of exactly the same size. The usual distribution of sizes would probably follow a normal distribution curve as shown schematically in Fig. 1 by a full line. Then (Case I) at some temperature at which there is sufficient atomic mobility for all the grains to the right of the vertical line "A-A" to start to grow, there will be so many grains growing that none can become extremely large and the final grain size distribution will perhaps be as shown by the dotted curve of Fig. 1.

However, if by some means, the normal movement of atoms across the boundaries at this temperature can be restricted so that only the very largest grains (those to the right of the vertical "B-B" in Fig. 1) can grow, and since these large grains are so few in number, the final grain size at this temperature may be very great. (Case II)

Finally, (Case III) if the atomic movement from the boundary can

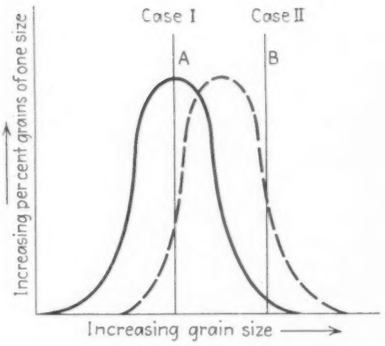

FIG. 1—Schematic presentation of grain size distribution.

be restricted to such an extent that none of the grains are large enough to grow at this temperature, then the grain size will remain unchanged and therefore no grain growth can take place.

Other methods of producing extreme amounts of grain growth include:

(1) **Temperature differences within the piece which permit the largest grains at some section to start to grow while the balance of the material is below the required temperature for any growth.**

(2) **Cold working seems to produce an artificial grain size contrast which permits grains to grow at temperatures less than those usually required. Critical amounts of cold working may permit very large amounts of grain growth, while at only slightly lesser or greater amounts, little or no growth takes place.**

In steel, the problem of grain growth is complicated by the allotropic transformation of iron from the body-centered alpha state to

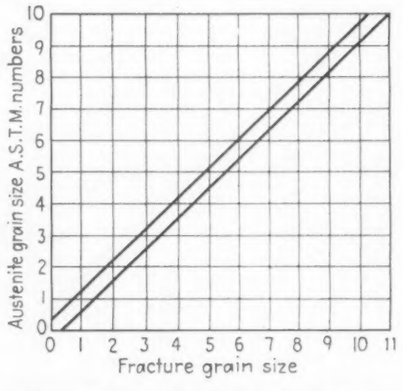

FIG. 2 — Relation between A.S.T.M. and fracture austenite grain size numbers.

the face-centered gamma condition. This means that the grain structure of the alpha iron is obliterated and replaced by a new set of grains when the iron undergoes the transformation at the Ac_3 temperature.

For low carbon steels and irons as used for sheets, it is the grain size of the alpha iron or ferrite, the solid solution of carbon or other alloys in alpha iron, which is the more important. The possibilities of altering the ferritic grain sizes by changes in amounts of cold working or reheating temperatures and the variations in these which may be produced by melting practices are interesting and important[5,9]. However, in this article, the changes which occur in the grain size of the iron in the gamma state or austenite, the solid solution of carbon or other alloys in this gamma iron, only will be treated and changes in the ferrite grain size will be considered only to the extent that such changes might affect the austenite.

Measuring Austenite Grain Size

Since in plain carbon and alloy steels the austenite is only stable at high temperatures, it is necessary to use some device to outline the grains as they existed at this higher temperature when the sample has transformed on cooling to room temperature. Several possible procedures include:

(1) **Carburizing to produce a hypereutectoid zone in which, on slow cooling, the excess cementite will be located at the grain boundaries of the austenite.**

(2) **Carburizing as in (1), but using the separation of the ferrite in the higher carbon section of the hypoeutectoid zone to show the austenite size.**

(3) **Heating eutectoid steels above the critical temperature and cooling at a rate which will permit the transformation to fine pearlite to start at the austenite grain boundaries, and then quenching rapidly so that the greater part of the grain becomes martensite.**

(4) **Heating steels with sufficient carbon above the critical temperature and then quenching to form martensite followed by etching to produce contrast between adjacent martensite patches which are the size of the original austenite.**

(5) **Heating eutectoid steels in a decarburizing atmosphere which preferentially attacks the austenite grain boundaries to produce either**

a relief etched surface or an outline of fine pearlite when the sample is quenched in such a way as to produce martensite in the areas not decarburized.

All these methods depend upon measuring the grain size microscopically. Various methods, such as the Jeffries circle count and the Heyn intercept method, are used occasionally to measure and record the austenite grain size, but the more common one is the A.S.T.M. method[1] in which the grain size is determined by comparing the projected image with a series of diagrams numbered from the coarsest, as 1, to the finest, as 8, in which the average number of grains per square inch at a magnification of 100 diameters is given by the formula $n = 2^{N-1}$, in which N is the A.S.T.M. grain size number. On this basis an A.S.T.M. grain size of 1 would correspond to an average number of grains of $n = 2^0$, or 1 sq. inch at 100 diameter; while an A.S.T.M. grain size of 8 would be $n = 2^7$, or 128. This system can be expanded to negative numbers for very large grains or to numbers larger than 8 for the very small.

In addition to these microscopic methods, the fracture method, which depends upon cooling high enough carbon steels from above the critical fast enough to produce hard martensite and then notching and breaking the sample so that the fracture follows the grain boundaries of the original austenite, is very useful. The appearance of the fracture is compared with that of an arbitrarily numbered series of standards, which standards fortunately correlate very closely with the A.S.T.M. number series, as can be seen from Fig. 2.

Actually, the fracture method is in many cases more accurate than any of the microscopic procedures because it is possible to get an impression of the whole cross-section in the fracture, while the section under the microscope may show local and comparatively insignificant irregularities. Also, it should be recognized that the cross-section prepared for examination under the microscope will not cut all the grains on their major axes and therefore it will always be possible to find a few apparently small grains in a field. However, if several small grains are clustered together, it would have been impossible to have cut through large grains in such a way as to have produced this effect and, therefore, a mixed grain size must exist.

Limitation of the Concept

It has become customary to consider the austenite grain size of steel to be a "heat" characteristic and to speak of steel as "inherently fine or coarse grained." The dictionary defines "inherent" as existing in something else so as to be inseparable from it and gives as a synonym the word "inborn." When applied to such steels as those containing vanadium or to the high alloy tool steels, the term "inherently fine grain" has true significance, since these steels under all ordinary conditions of heat treatment remain fine grained; but if applied to other grades, for example, to differentiate between those killed with or without aluminum, some serious discrepancies may develop.

For instance, in the Diamond Chain laboratory McQuaid - Ehn tests (carburize at 1700 deg. for 8 hr., cool in box and compare the grain size of the hypereutectoid zone with the standard A.S.T.M. charts) are run on all steels for critical carburized parts, and, based on this austenite grain size as a "heat" characteristic, only one small piece, cut from the end of one of the samples presented for chemical and physical tests, is used. This has proved to be a satisfactory acceptance check on literally thousands of heats. But one lot of S.A.E.-3115, which was specified fine grained A.S.T.M. 5-8, was rejected when the McQuaid-Ehn test showed 1-3, and when the mill insisted that the same test made on the billets showed 5-7, additional tests were made on the coiled strip. It was certainly disconcerting to find that one end of the coils in this lot showed large 1-3 grains while the other end of the same coil showed 5-7 on the McQuaid-Ehn test. This peculiarity was traced to the fact that this particular shipment was for an odd part which was not made regularly and it was hot rolled from a billet size normally used for heavier sections. Actually, as a standard practice these parts were reheated after carburizing at a temperature well below 1700 deg. and the fracture grain size and physical properties of these parts made from this peculiar material were normal in every respect. This last statement naturally introduces the subject of the desirability of testing the austenite grain size of the material at one temperature when it is to be given a final heat treatment at some other.

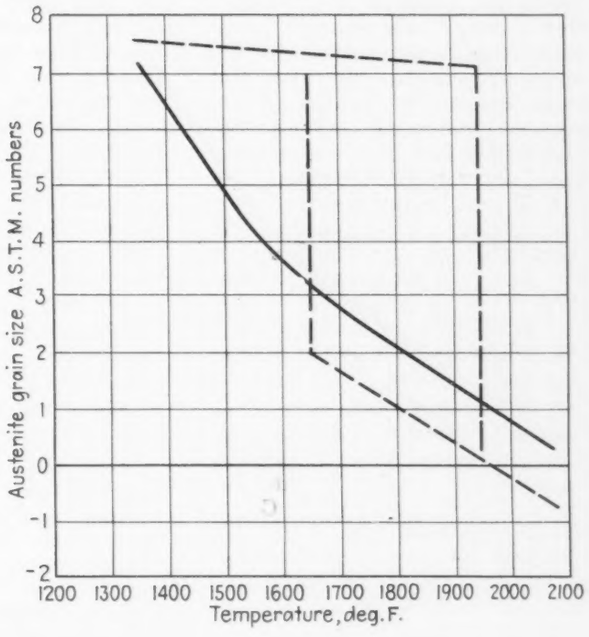

FIG. 3—Effect of temperature on austenite grain size.

The two curves of Fig. 3 indicate the general relationship between the maximum temperature and the austenite grain size. The steel for which the full line has been drawn shows a gradual coarsening so that as the temperature is increased, the austenite grains be-

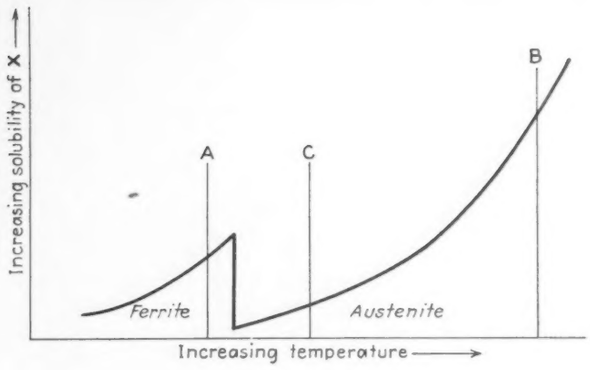

FIG. 4—Solubility of austenite grain growth inhibiting material X. (After Dorn and Harder.)

come larger and larger, while that for which the dotted line has been reproduced, which is characteristic of those killed with aluminum, shows very little change up to some critical temperature at which very rapid growth occurs. Based on using only one testing temperature, such as 1700 deg. F. as in the McQuaid-Ehn test, parts treated at final temperatures lower than 1700 deg. F. will never show a larger austenite grain size than that indicated by the test, but the grain size may be very much finer. If the final temperature is greater than that used in the test, the austenite grain size will never be finer but may be very much coarser.

It is assumed that steels which show the austenite grain size temperature relationship indicated by the solid line of Fig. 3 fulfill the characteristics described for Case I already discussed under "Basic Working Concepts," while steels which show the relationship indicated by the dotted line correspond with the concepts of Case II.

Since this latter type of austenite grain growth is characteristic of steels killed with aluminum, it was early assumed that the material obstructing the normal grain growth was Al_2O_3. This assumption was based largely on the simple analogy between the austenite grain growth characteristics of these steels and the behavior of tungsten containing controlled amounts of thorium oxide. This assumption is subject to several criticisms, but the work of Brophy[10] and Mehl[11], who showed that aluminum-killed iron-carbon alloys when carburized in an atmosphere which contained no oxygen were very coarse grained, while the same material carburized with the usual carbon dioxide producing compounds was extremely fine grained, certainly indicates that aluminum and oxygen are the controlling elements.

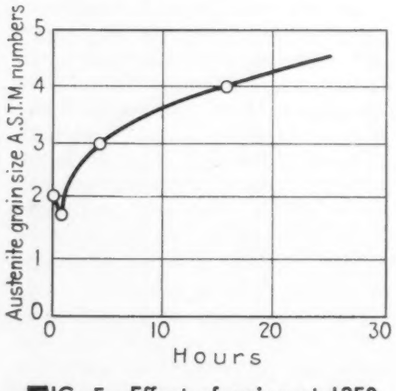

FIG. 5—Effect of aging at 1250 deg. F. on austenite grain size at 1750 deg. F. (After Dorn and Harder.)

Dorn and Harder[12] suggested that this obstructing material which they called "X" had a solubility-temperature relationship indicated by Fig. 4, and they were able to show that the austenite grain size of a medium carbon steel could be manipulated by:

(1) Holding the steel for long periods of time at a temperature corresponding to position A in Fig. 4 (1250 deg. F.) and then raising the temperature into the austenite zone. In this case, a part of the X phase is assumed to be dissolved in the ferrite and this is precipitated out in a very finely divided state when the ferrite changes to austenite, and this finely divided X phase inhibits grain growth. That this treatment appears to work out is shown by their data reproduced here as Fig. 5.

(2) Heating the steel to a high temperature, position B in Fig. 4 (2000 deg. F.), dissolves a great part of the X phase and if

[a] the steel is quenched from this high temperature, the dissolved X phase will be prevented from precipitating during cooling, but will come out in a finely dispersed form during the reheat, and such samples when reheated will be fine grained at the ordinary testing temperature (1700 deg. F.)

[b] the sample had been slowly cooled to about point C on Fig. 4 (1500 deg. F.), then the X phase which had been dissolved at the high temperature would be precipitated at the grain boundaries of the large austenite grains formed at this high temperature, and if the sample is then cooled to room temperature and reheated to the normal testing temperature (1700 deg. F.) the austenite grain size will be very coarse, since the X phase was not in position to inhibit the grain growth.

The writer repeated the second part of this series of manipulations on a carburized sample of X-1020, which was fine grained A.S.T.M. 7-8, after the normal McQuaid-Ehn test at 1700 deg. F. and discovered that the changes reported by Dorn and Harder could be reproduced in the hypoeutectoid zone but that the hypereutectoid zone remained fine grain.

Bain[13] had reported a similar condition of a fine grained outer case with a coarse grained inner section, and his explanation suggested that in these steels there was an excess of aluminum, and that during the heating cycle enough oxygen diffused into the surface a short distance and the resulting aluminum oxide formed before the temperature reached a maximum prevented austenite grain growth at the highest temperature reached; while in the zone below, the amount of oxygen was insufficient to prevent grain growth and a large grain size quickly developed. Oxygen penetration continued during the carburizing cycle and austenite grain growth inhibiting material was formed. Such material is powerless to refine the large austenite grains already formed, but if the same sample is cooled below the critical and reheated a completely fine grained case should be developed, since the austenite grain growth inhibiting material can now act. This observation was confirmed by the writer on the fine grained X-1020 at 1700 deg. F. discussed above. After carburizing at 1850 deg. for 4 hr., the hypereutectoid zone showed an austenite grain size of A.S.T.M. 7-8, while the hypoeutec-

toid zone was 1-2. A duplicate sample quenched after carburizing showed about 0.020 in. fine grained A.S.T.M. 7-8, while the rest of the 0.080 in. total case was very coarse, about 1-3. After reheating this water quenched sample to 1850 deg. for 1 hr., the entire case was fine grain, A.S.T.M. 7-8.

As early as 1933, Grossmann[11] had shown that the grain size could be affected by changes in preliminary treatments. He reported his results in terms of the number of coarse grains present after carburizing at various temperatures and assumed that the greater the number of coarse grains in per cent, the lower the temperature at which grain growth started. Fig. 6, taken from his work, illustrates the effect of prior heat treatment and it can be seen that normalizing before carburizing drastically lowered the temperature of grain coarsening. Fig. 7, which was also taken from this work, shows the effect of increasing amounts of hot working and it is of course clear that a steel can exhibit various austenite grain sizes when carburized at high temperatures, depending upon the amount of previous hot work. The peculiar result on the coiled S.A.E.-3115 in which one end was coarse and the other fine, is considered to be further evidence that relatively small changes in the processing of the steel at the mill may produce significant austenite grain size differences.

Schempp and Shapiro[15] showed the effect of various treatments on the grain size produced by carburizing eutectoid tool steels, and perhaps their most interesting result was that critical amounts of cold working could lower the temperature of austenite grain growth sufficiently to permit large austenite grains to form at the normal McQuaid-Ehn temperature. The writer has never been able to reproduce their results in the carburizing grades of steel. In fact, a recent series of tests on 14 different lots, which included annealed plain carbon and nickel cast steel, S.A.E.-1020 plates, and X-1020, and an open hearth free machining carburizing grade in rounds, with austenite grain sizes in the normal McQuaid-Ehn treatments ranging from coarse 1-3 to fine 7-8, the austenite grain size at the base or sides of a Brinell impression was essentially the same as that found on the cut edges of the samples.

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FIG. 6—Influence of prior heat treatment on the coarsening temperature.

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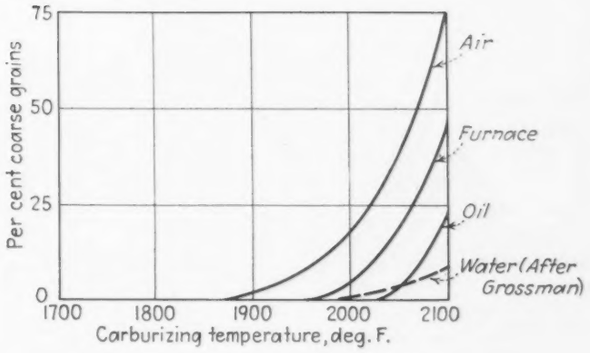

Grossmann[14], and more recently, Rosenberg and Digges[16], have studied the effect of the rate of heating through the critical range on the grain growth of the austenite. They found that changing the rate of heating did produce differences, but the direction of the change varied with the material. With pure iron-carbon alloys, containing 0.50 C, the grain size at temperatures up to 1600 deg. F. increased with a decrease in rate of heating; whereas the grain size at 1800 deg. F. was less noticeably dependent upon the heating rate. At 1475 deg. F. the austenite grain size of commercial steels containing 0.49 per cent carbon tended to increase with increase in rate of heating in heats which had been treated to control the grain size as well as those which were non-controlled, but at 1650 deg. and 1800 deg. only the austenite grain size of the uncontrolled steels was affected.

The writer was unable to find significant differences in the normal McQuaid-Ehn results on carburizing steels between samples packed in cold compound in a cold box and those added after the box and compound had reached 1700 deg. F. With the size of samples used, the differences between the heating rate were of the order of 60-100 to 1, but these results do not alter the conclusion of Rosenberg and Digges that consideration must be given to the possible effects that rate of heating through the transformation range may have upon the austenite grain size of steel.

It is difficult to explain the mechanism by which all these variations in the austenite grain size can be produced by these manipulations except to assume that these treatments have varied the amount or distribution of the inhibiting material X, which is probably Al_2O_3, but it should be apparent that the term "inherent" as applied to the austenite grain size of these steels has only a limited significance.

Also, it should be clear why it is not possible or desirable to specify the austenite grain size more closely than the restrictions listed by the American Iron and Steel Institute[17] which is as follows:

"Limited austenite grain size refers to specifying a restricted range of grain size numbers. Manufacturing practice limits such a restric-

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FIG. 7—Effect of increasing amounts of hot working on the coarsening temperature.

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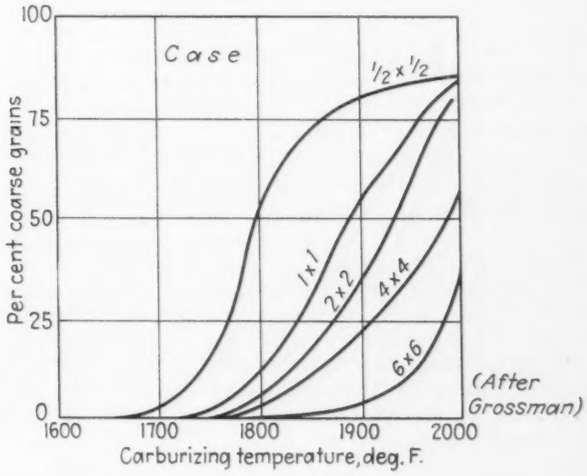

TABLE I

Effects of Austenite Grain Size

	A.S.T.M. Grain Size — Coarse, 1-4	A.S.T.M. Grain Size — Fine, 5-8
(I) Applications in which austenite grain size has been found to be very important:		
[A] In hardened and tempered state:		
(a) Toughness at relatively high hardness	lower	higher
(b) Hardenability (depth of hardened zone)	greater	lower
(c) Hardenability (freedom from soft spots)	better	poorer
(d) Distortion	greater	lower
(e) Internal stress	greater	lower
(f) Austenitic retention	greater	lower
[B] As annealed or normalized:		
(a) Machinability (rough)	better	poorer
(b) Strength or hardness as normalized	higher	lower
(II) Applications in which austenite grain size may be important in some special cases:		
[A] In annealed or normalized condition:		
(a) Machinability (fine finish)	inferior	superior
(b) Blanking	more irregular	smaller burrs
(c) Rate of cold working	more rapid	less rapid
(d) Creep resistance:		
At lowest temperatures	inferior	superior
At highest temperatures	superior	inferior
[B] In austenitic state:		
(a) Rate of carburizing and decarburizing	faster(?)	slower(?)
(III) Applications in which austenitic grain size may be considered to be unimportant:		
[A] In hardened and tempered state:		
(a) Maximum hardness (assuming that there is no direct transformation to fine pearlite nor any retained austenite).		
(b) Resistance to fatigue.		
(c) Toughness at relatively low hardness.		

tion to the following conditions: The specified range shall include not less than three consecutive numbers at either end of the A.S.T.M. series, for example, 2 to 4 or 6 to 8, inclusive; it is impractical to control grain size in the intermediate ranges, that is 4 to 6. The grain structure is to be considered satisfactory if 70 per cent is within the specified grain size limits."

Effects of Austenite Grain Size

Grain size has been shown to be so important in some cases that probably every phase of the problem of the use of metals has been investigated to determine the significance of this variable.

In a general way Table I, based on summaries by Ward and Dorn[4], Bain[3] and Stagg[18], probably represents the present state of knowledge about the effects of austenite grain size.

Such tables give only rough comparisons and for many purposes it would be necessary to have more definite data before it would be possible to make definite recommendations or attempt to include austenite grain size in the specifications for the steel for any part.

Unfortunately, such quantitative data are not as readily available as might be expected and the discussions to be presented next week simply amplify some of the main points in Table I.

References

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[2] The Science of Metals, Jeffries and Archer: (a) "The Amorphous Metal Hypothesis," Chapter IV, p. 63; (b) "Grain Growth and Recrystallization," Chapter V, p. 85.

[3] National Metals Handbook, A.S.M., 1939 Edition: (a) "Austenitic Grain Size in Steel," Bain and Billela, p. 754; (b) "The McQuaid-Ehn Test," McQuaid, p. 750; (c) "The Use of Aluminum for Control of Grain Size in Commercial Steels," McQuaid, p. 811.

[4] "Grain Size of Steel—A Critical Review," by Ward and Dorn, Metals and Alloys, vol. 10, 1939, p. 74, 115, 212, 246.

[5] National Metals Handbook, A.S.M., 1939 Edition, p. 7.

[6] National Metals Handbook, A.S.M., 1939 Edition, p. 12.

[7] "Some Things We Don't Know About the Creep of Metals," by Gillett; Transactions A.I.M.E., 1939, p. 30-31.

[8] "Grain Growth in Sheet Steels during Box Annealing," by Samuels; Transactions A.I.M.E., vol. 131, 1938, p. 327.

[9] "The Effect of Type of Cold Deformation on the Recrystallization Properties of Armco Iron," by Kaiser and Taylor; Transactions A.S.M., vol. 27, 1939, p. 227.

[10] "Influence of Aluminum on the Normality of Steel," by Brophy and Parker; Transactions A.S.M., vol. 25, 1937, p. 325.

[11] "Some Factors Influencing Austenite Grain Size in High Purity Steels," by Mehl, et al.; A.S.M., vol. 26, 1938, p. 153.

[12] "Relation of Pre-Treatment of Steels to Austenite Grain Growth," by Dorn and Harder, Transactions A.S.M., vol. 26, 1938, p. 106.

[13] "General Relations Between Grain Size and Hardenability and Normality of Steels," by Davenport and Bain, Transactions A.S.M., vol. 22, 1934, p. 879. (Grain Size Symposium).

[14] "Grain Size in Metals with Special Reference to Grain Growth in Austenite," by Grossmann, Transactions A.S.M., vol. 22, p. 861. (Grain Size Symposium).

[15] "Variants Influencing Grain Size as Determined by Standard Methods," by Schempp and Shapiro, Transactions A.I.M.E., vol. 125, 1937, p. 411.

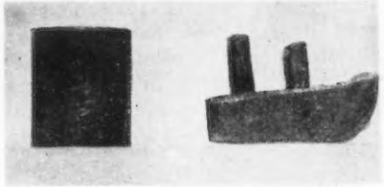
[16] "Effect of Rate of Heating Through the Transformation Range on Austenite Grain Size," by Rosenberg and Digges, A.S.M., 1940 Preprint No. 12.

[17] Steel Products Manual—Standard Chemical Compositions, etc. for Carbon Steels, etc., American Iron and Steel Institute, May, 1941, p. 8.

[18] Unpublished talk on grain size of steel, delivered by H. J. Stagg to the Canadian Chemical Society, May, 1940.

(To be continued next week)

SUCCESSFUL cold forging of complicated contact fingers from copper bar stock in a single die forming operation is now being performed with the aid of a dry lubricating parting compound. Seizing of the copper in the die and normally high die wear is eliminated by dipping the copper slugs in Oildag type 1104 colloidal graphite suspended in oil, thereby forming a graphoid surface on the part and preventing metal-to-metal contact in the die and consequent pick-up and sticking.



Magnetic Testing Simplified

By J. A. SAMS and E. A. STACK
General Electric Co., Schenectady

o o o

IT is often desirable to make permanent records of cracks, seams, and other defects revealed in forgings, shaftings, and tools by means of magnetic testing.

Heretofore, the most satisfactory method of recording these defects has been to photograph the defective part, as illustrated in Fig. 1. However, considerable item is required to provide a background sufficiently contrasting to make the defect visible.

A new, quick and inexpensive method of making equally good or even better records of these defects has been developed in the laboratories of General Electric Co., Schenectady, N. Y. When a defect is located by the usual magnetic testing process, transparent, gummed cellulose tape is applied, gummed side down, over the defect. This tape is then removed and mounted on a white cardboard.

Some of the magnetite outlining even the smallest part of the defect adheres to the gummed surface of the tape, and, when sealed against a card, forms a durable and permanent record, as shown in Fig. 2.

If more than one record is desired, the original tape, mounted on the cardboard can be photographed, or, if mounted on glass or other transparent material, can be blueprinted or silverplated. The method has various applications, among others being the recording of magnetic field strengths and patterns.

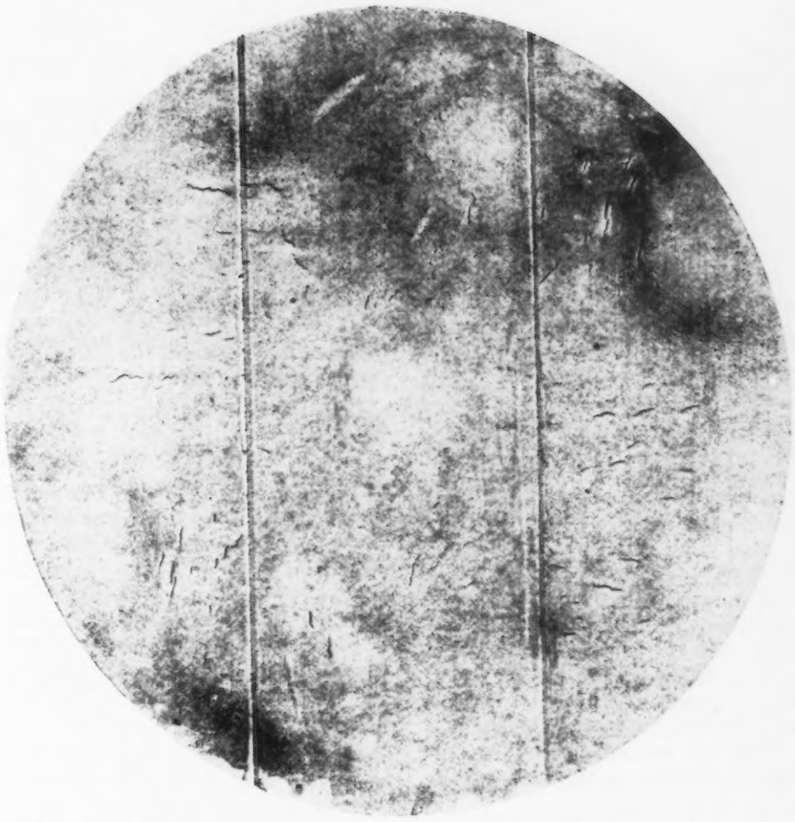


FIG. 1—A photographic reproduction of a steel part showing the cracks disclosed by magnetic testing.

FIG. 2—Magnetite, adhering to the strip of gummed cellulose tape, plainly outlines the crack in a defective metal part.

German Manual on Wire Technology

ACCORDING to W. Trinks, of the Carnegie Institute of Technology, the first book of a series of small manuals on well circumscribed subjects, published by Stahleisen (the German Iron and Steel Institute) in German, has just been received. This book, devoted to the subject of steel wire, is entitled Stahldraht, by A. Pomp, and published by Stahleisen, Dusseldorf, Germany.

The book begins with properties of the hot rolled rod and ends with testing the finished wire. All intermediate stages and processes are described in detail. The book is a happy mixture of sound theory and advanced practice, as far as the latter has been released for publication. It may be remarked that Dr. Pomp is the outstanding German authority on the theory of wire drawing.

Those readers who are exceedingly well versed in the manufacture of steel wire may possibly miss information on extremely specialized details here and there, but the average reader will find his every question answered as regards theory, engineering, metallurgy and operation of pickling, drawing, annealing, patenting, hardening, coating and testing. The book can be imported through any dealer in foreign books such as G. E. Stechert & Co.

OPTICAL FLATS

OPTICAL flats have become indispensable in industry for gaging the surfaces of parts used in oil seals, compressor thrust washers and many other machined parts, and the growing importance of surface finish in modern precision work has brought increasing demand for wider application. Extensive study, notably by the Mid-West Abrasive Co., Detroit, has been devoted to the development of a method for obtaining optically flat metal surfaces on a mass-production basis. With perfection of this method, a discussion of the characteristics of optical flats and of some of the problems involved in their production is timely.

By L. P. JACKSON
Mid-West Abrasive Co., Detroit

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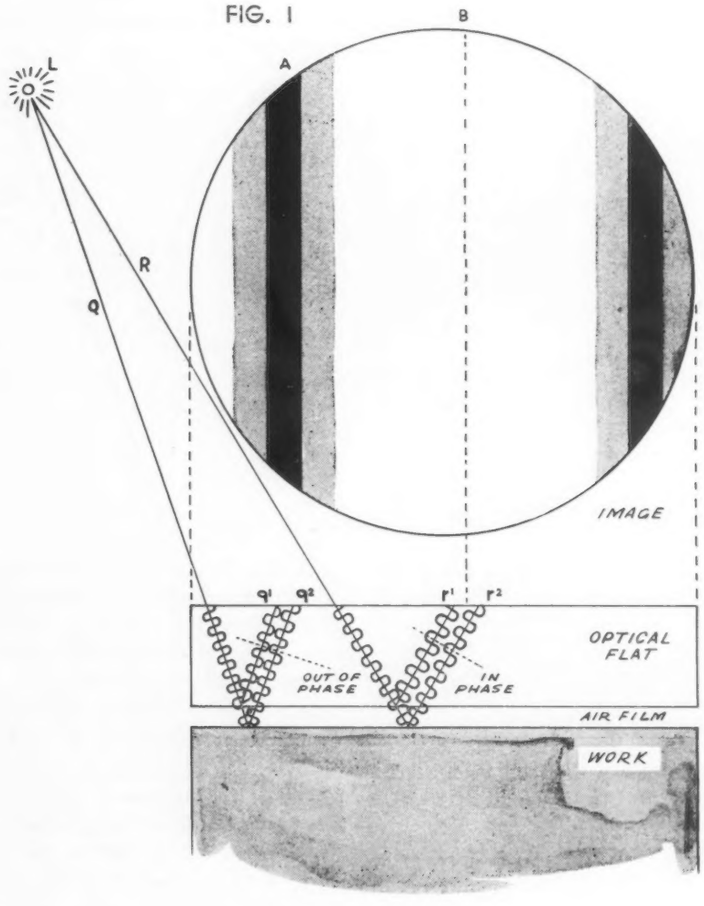
Modern precision work requires dimensional accuracy in millionths of an inch. For measuring surface flatness to that degree of accuracy, the principles of light waves and light wave interference are used. The equipment for making these measurements is an optical flat, and a source of light is preferably monochromatic (light of one wave length or color).

A typical optical flat is a disk, made of a semi-quartz material about ¾ in. thick and 2 or 3 in. diameter. For checking surface flatness it need have only one plane face which, for average commercial use, is a working flat of 0.000001-in. accuracy. For checking height or spacing of parts, both faces must be plane, parallel to 0.000005 in., and the thickness accurate to within plus or minus 0.00001 in.

FIG. 1



Checking Surface Flatness

In checking the flatness of a surface, the optical flat is lightly slid over the surface from the side or placed directly on the surface and tapped lightly, taking care to keep the surface free of foreign matter. As illustrated by the exaggerated drawing in Fig. 1, incoming rays of light, Q and R from source L, passing through the optical flat are partially reflected by its own surface, q^1 and r^1, and partially by the surface of the work, q^2 and r^2. As these two surfaces are separated by a minute film of air, the rays q^2 and r^2 must travel farther than q^1 and r^1 by twice the distance between the two surfaces, and they will therefore lag slightly behind. As rays of light travel in waves, this causes the two reflected wave trains to be shifted slightly lengthwise of each other. If, as in q^1 and q^2, the two reflected wave trains are out of phase, that is, the waves of

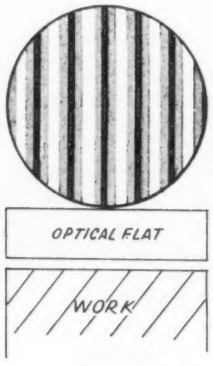


FIG. 2

by Mass Production

—Elimination of hand lapping operations in making optical flats has effected considerable savings in their production time and cost, thus making the manufacture of these surface gages practical for general industrial production.

o o o

q^2 oppose those of q^1, they produce a dark band as at A. If, as in r^1 and r^2, the two reflected wave trains are in phase, match and reinforce each other, they produce a band of light as at B. The spacing between these bands represents a height difference between the two surfaces of half a wave length of the light used. With daylight as the light source, the bands contain all colors of the spectrum, so for a sharper band pattern and more accurate reading, monochromatic light is preferred. Krypton gas or mercury lamps will give corrections to 0.000012 in., while sodium vapor light permits readings accurate to 0.000006 in.

The pattern formed by these interference bands indicates the extent and direction of any deviation of the surface of the work from true flatness. If the bands are straight and evenly spaced, as shown in Fig. 2, the surface is flat. If the surfaces should contact within about 0.000003 in. and both are accurate flats, instead of a series of bands the entire area will show a solid gray color. Figs. 3, 4 and 5 show other typical band patterns and exaggerated drawings of the deviations from flatness which they indicate. In Fig. 3, the depression in the surface of the work is indicated by the bands becoming narrower and closer together and the appearance of additional bands over the center of the depression. In Fig. 4 the bands become narrower and curve closer together as the surface of the work falls away from the high center. In Fig. 5 the surface of the work gives straight and evenly spaced bands over the larger portion of it which is flat, the bands narrowing and the curving closer together over the portion which curves away.

Making Optical Flats

Optically flat surfaces have been used on automotive and airplane precision parts for some time but the chief drawback to their more extensive industrial use has been the time and skilled labor required to produce them. The piece to be surfaced must first be rough ground. This is a machine operation and the time required is determined by the area to be ground. The second operation is a finish grind which produces a surface that is flat and smooth within a correction of about 20 microinches r.m.s.

The final finishing consists of a series of lapping operations which have been done largely by hand. Even when lapping machines were used, the final operation was still by hand. Hand lapping is a slow and highly skilled operation. The work is rotated on cast iron lapping blocks with abrasives of varying degrees of fineness and hardness. Where fine precision was required, hand lapping resolves itself into several operations, each employing an abrasive of increasing fineness.

In spite of the time and high degree of skill involved and the re-

For articles on selection and grading of abrasives and on superfinishing, see THE IRON AGE, *April 25 and July 11, 1940.*

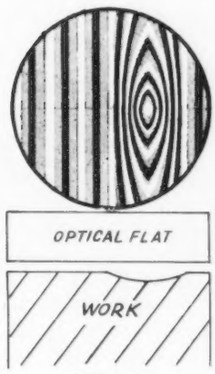


FIG. 3

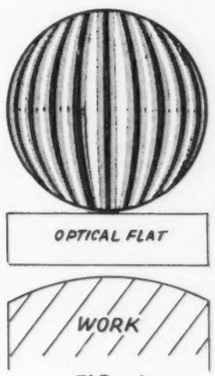


FIG. 4

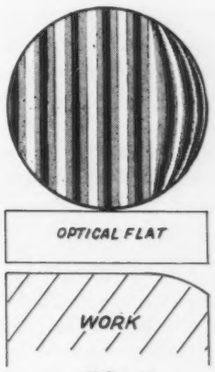


FIG. 5

sulting high production cost, the advantages of optically flat surfaces have proved sufficient to justify their limited use. The desire to obtain such surfaces on a mass-production basis and thus extend their application to many parts where the high production cost made them prohibitive led to intensive study of the problems involved.

Experimental work with different types of abrasives was undertaken by the Mid-West Abrasive Co., some time ago, with a view to eliminating all hand lapping operations. From experiment it soon became apparent that the solution lay in the development of a proper bonding agent. With the bonding agents then in use, if the abrasive stone or disk was "hard" enough to retain the abrasive grains firmly, thus reducing wear and assuring that the stone would stay flat, the tendency to "load up" and stop cutting became great. If the bond fracture rate was increased sufficiently to make the stone self-cleaning, then the grits would tear away unevenly, spoiling the flatness of the stone and, consequently, of the work.

The search for a bonding agent that would allow the stone to be self-cleaning and still wear evenly led to the development of Micro-Bond. Being of high capillarity, each grain is completely insulated and supported, adherence of two or more grains is impossible, and an even grain structure is maintained. The grain structure remaining uniform, even wearing and precision flatness is assured.

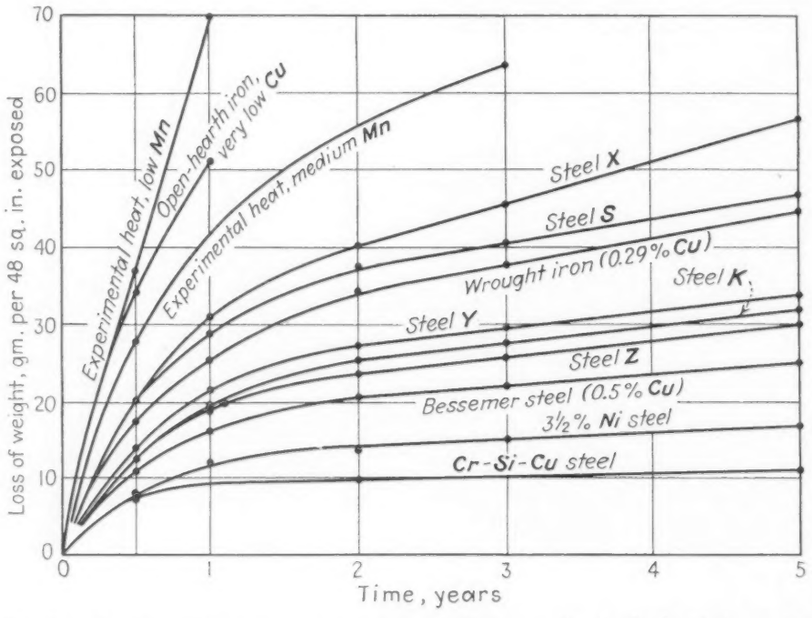
Using stones made with Micro-Bond, a surface finish of two microinches r.m.s. is obtained in a minimum contact time directly from an 18 to 20 microinch ground finish. All hand lapping operations are eliminated with consequent tremendous saving in time and cost, and the manufacture of optical flats for general industrial production work is made practical. Flats obtained by this method have so perfect a surface that, when two are pressed together they will adhere in a manner similar to the action of gage blocks.

Corrosion Resistance of Irons and Steels

DURING a discussion between Dr. U. R. Evans and E. S. Taylerson, when the former was visiting this country, the suggestion was made that it would be interesting to compare corrosion rates of steels in the U. S. with those obtained at the various exposure stations of the Corrosion Committee (English). In 1931 several specimens of the committee's steels, X, Y, and Z were received from Dr. J. C. Hudson, the committee's official investigator.

At that time Mr. Taylerson's company started an extensive investigation on a large number of other materials, so that it was possible to include the British steels in exposure tests at three locations—an industrial marine atmosphere (Kearny, N. J.); an industrial atmosphere (Vandergrift, Pa.); and a rural atmosphere (South Bend, Pa.). While these tests were intended to supply information for the commercial development of low-alloy steels, the results for a number of the American materials have been included as a matter of general interest, in a paper by E. S. Taylerson, presented recently by the Iron and Steel Institute (British).

The chemical compositions of the materials are covered in the accompanying table. Also, graphs showing the corrosion rates in the one area—industrial marine atmosphere—are given herein. The results illustrate the great influence of copper and the even greater protective value of higher percentages of alloying elements.



Results of atmospheric corrosion tests at Kearny, N. J. (industrial marine atmosphere).

Chemical Analysis of the Materials

Material	C, Per Cent	Mn, Per Cent	P, Per Cent	S, Per Cent	Si, Per Cent	Cu, Per Cent	Ni, Per Cent	Cr, Per Cent
Committee's steel *X* (0.03 per cent Cu)	0.18	0.61	0.041	0.043	0.008	0.03	0.05	0.04
Committee's steel *Y* (0.26 per cent Cu)	0.19	0.60	0.040	0.043	0.009	0.26	0.05	0.05
Committee's steel *Z* (0.54 per cent Cu)	0.20	0.62	0.038	0.043	0.010	0.54	0.05	0.05
Committee's pollution specimens (ingot iron)	0.02	0.05	0.013	0.044	0.008	0.07	0.05	0.001
Experimental heat, low Mn and Cu	0.015	0.02	0.004	0.038	0.004	0.02	0.006	0.003
Experimental heat, medium Mn, low Cu	0.040	0.24	0.062	0.032	0.008	0.01	0.002	0.009
Open-hearth iron, very low Cu	0.018	0.025	0.005	0.019	0.002	0.008	0.002	0.01
Steel *S* (0.05 per cent Cu)	0.040	0.49	0.074	0.042	0.003	0.05	0.006	0.09
Wrought iron (0.29 per cent Cu)	0.018	0.095	0.096	0.028	0.14	0.29	.....	0.006
Steel *K* (0.27 per cent Cu)	0.026	0.47	0.066	0.045	0.003	0.27	0.03	0.03
Bessemer steel (0.5 per cent Cu)	0.10	0.40	0.107	0.057	0.007	0.52	0.002	0.02
3.5 per cent Ni steel	0.043	0.46	0.014	0.027	0.004	0.06	3.52	0.16
Cr-Si-Cu Steel	0.11	0.62	0.012	0.006	1.25	1.03	0.07	3.88

Etching Technique

By M. G. CORSON
Metallurgical Consultant, New York

—A continuation of last week's discussion of the theory of etching and the application of neutral ferric chloride solutions to the etching of nickel and its alloys. Herein attention is directed to using the same solution for copper alloys; also, certain "strange structures" are noted, i.e. structures that do not exactly conform to the over-simplified ideas prevalent among metallographers.

TWELVE years ago this author was investigating the nature of iron-silicon alloys. During that research a co-worker took a number of micrographs of the alloys of the strictly binary as well as the ternary series—the latter containing about 0.8 per cent carbon.

Among the micrographs were some which did show rather strange markings which looked like wide open barley shells. These markings might be definitely identified as analogous to the needles of martensite were it not for the fact that their location had little in common with the granular structure of the metal. A large number of them crossed the grain boundaries from one grain into another, while those that stayed within the individual grains were strewn around in a most irregular manner. (At that time it was still believed that martensitic needles possessed a definite orientation in reference to the original austenite grain.)

Time passed and iron-silicon alloys were examined again and again by other researchers and some of them claimed that these markings had no real existence. What were they? Oh, just some etching effects.

This expression "mere etching effects" is used too frequently by some metallographers in order to brush aside a problem which they cannot solve. But, as stated last week there is no etching effect, no matter how queer, which is not connected intimately or loosely with the state of the surface etched.

Etching effects are constitutional features, and those markings as reproduced here in Figs. 3 to 6 possessed the following specific characteristics:

(1) They never appeared in alloys with less than 5 nor more than 14 per cent silicon. (See Figs. 1 and 2.)

(2) They were most frequent in the range of 8 to 10 per cent silicon.

(3) They were particularly dense in samples that were quenched from about 1000 deg. C.

(5) They could not be eliminated by rubbing off on a polishing wheel in the absence of alumina.

(6) They did not take place in the presence of higher amounts of carbon.

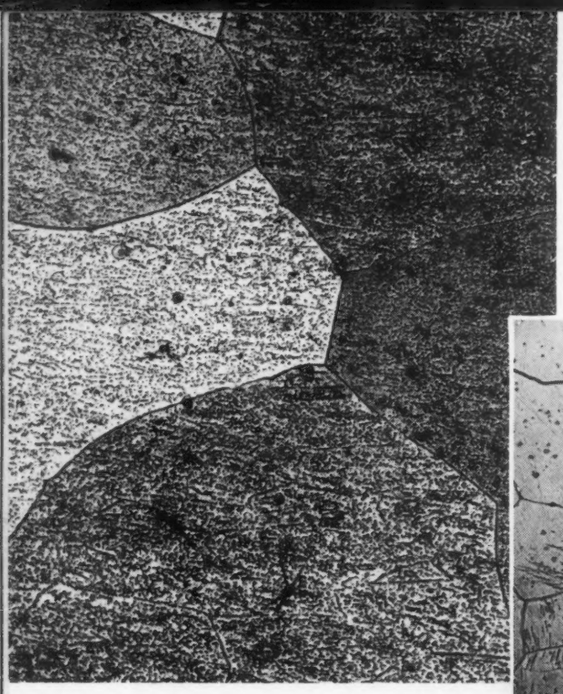
(7) The starting point of a group of such barley shell markings always carried a small but definite particle usually of a square shape, so that the structure might have represented cracks in heavy plate glass that had been hit with a brick.

As already mentioned, the barley shell markings did not take place in the presence of carbon. The latter formed a sort of eutectic very much like graphite in cast iron when the alloy was sand cast. The chill cast alloys looked quite different. They also carried a graphite (?) eutectic, but its granules were quite round and the general appearance was not unlike that of copper-copper monoxide or silver-copper, or the modified aluminum-silicon eutectic. (See Figs. 7 and 8.)

Of course these two types of structure were not particularly unusual and could be explained by variations in the cooling speed. However, there was also a third type appearing usually with slightly lower carbon contents. In it, the carbon phase formed thin, sharp lines running in three definite directions within each individual grain. (See Fig. 9.)

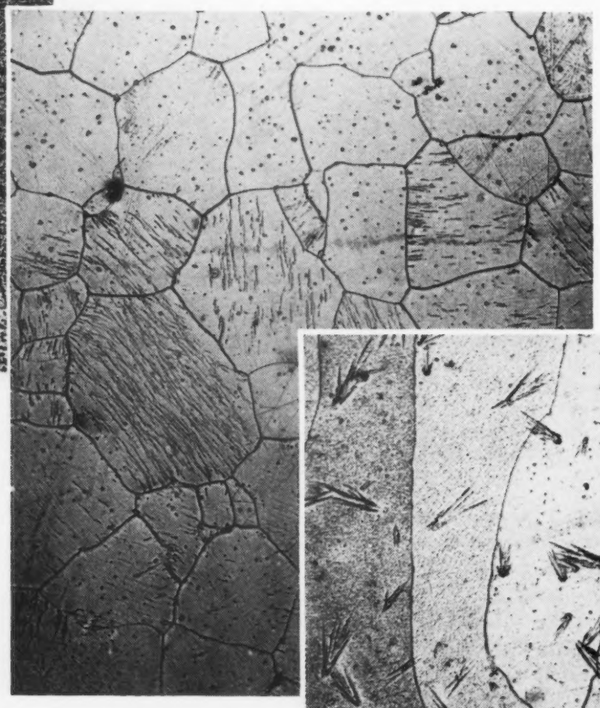
Those who believe that naming a thing means explaining it might be satisfied by saying: "just a case of Widmanstaettens." This author is neither inclined to accept such an explanation nor yet proffer one of his own. The fact is merely mentioned that carbon in iron-silicon alloys may take three shapes—lamellar graphite, globular graphite, and sharp linear graphite, the latter forming the "queer" feature, just as the barley shell markings form a queer feature in binary iron-silicon alloys containing between 5 and 12 per cent silicon. And, it would be worth the while of any metallographer to study these queer features in detail instead of dismissing them with a shrug of the shoulders.

The case of 5 per cent copper-silicon — Another case of queer structures was observed in 1925 while working on copper-silicon alloys. (Figs. 10 and 11.) It was found then (and reported in a paper) that alloys containing 5 per cent silicon behave in a rather peculiar manner. Quenched from any temperature above 600 deg. C. they



LEFT

FIG. 1—Iron silicon alloy with 5 per cent Si, as-cast. Shows fine precipitate, but no "barley shell" markings. At 100 diameters.



LEFT

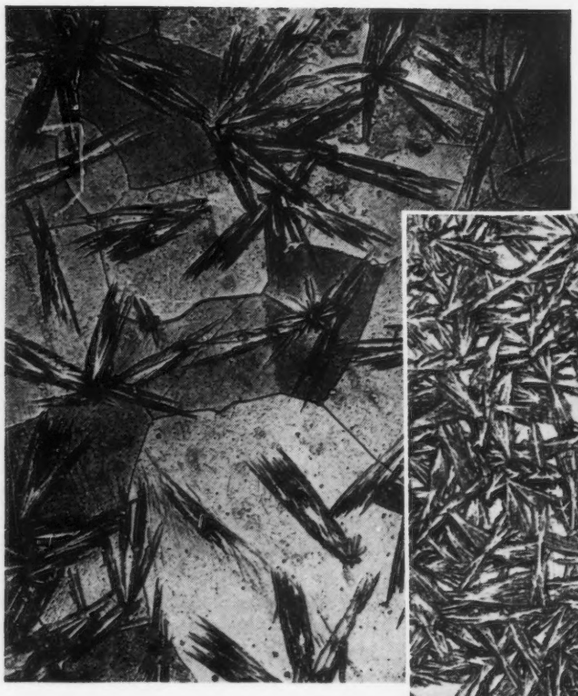
FIG. 2—Iron silicon alloy with 14.5 per cent Si, as-cast. Shows striation but no "barley shell" markings. At 100 diameters.

ABOVE

FIG. 3—Iron silicon alloy with 6 per cent Si, as-cast. Columnar grains with but a few "barley shell" markings. At 100 diameters.

BELOW

FIG. 4—Iron silicon alloy with 8 per cent Si, as-cast. Shows big brushes of "barley shell" markings. At 100 diameters.



RIGHT

FIG. 5—Iron silicon alloy with 8 per cent Si, annealed at 1000 deg. C. and quenched. The structure looks decidedly "martensitic." At 100 diameters.

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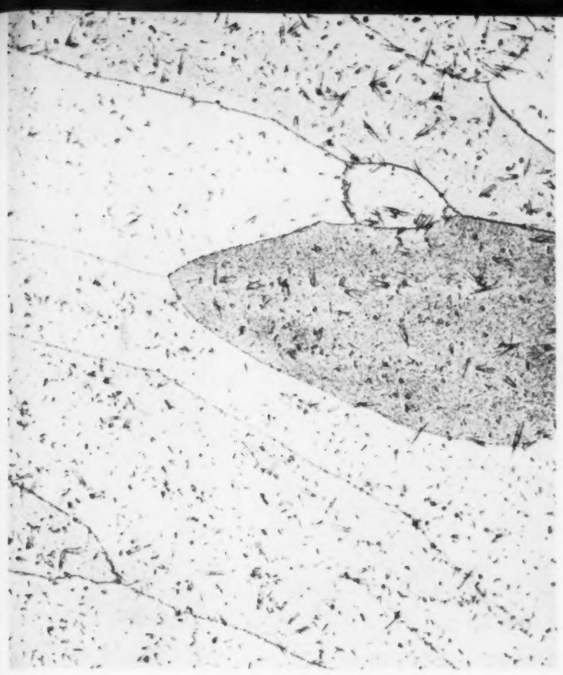
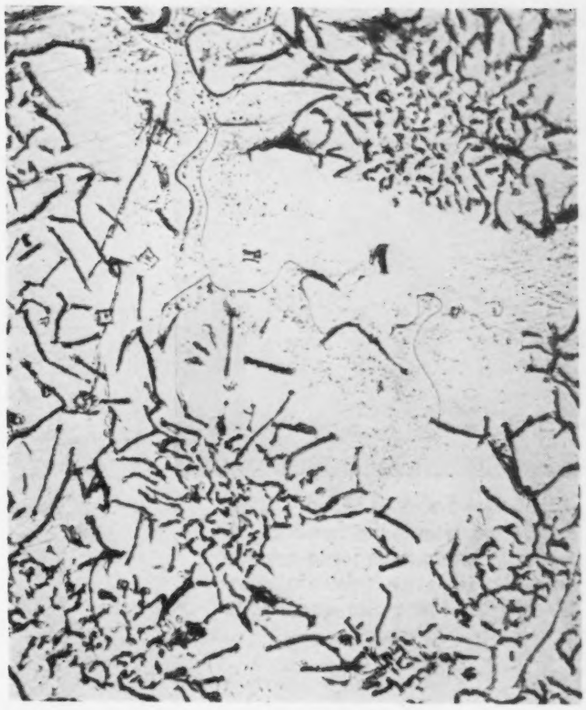


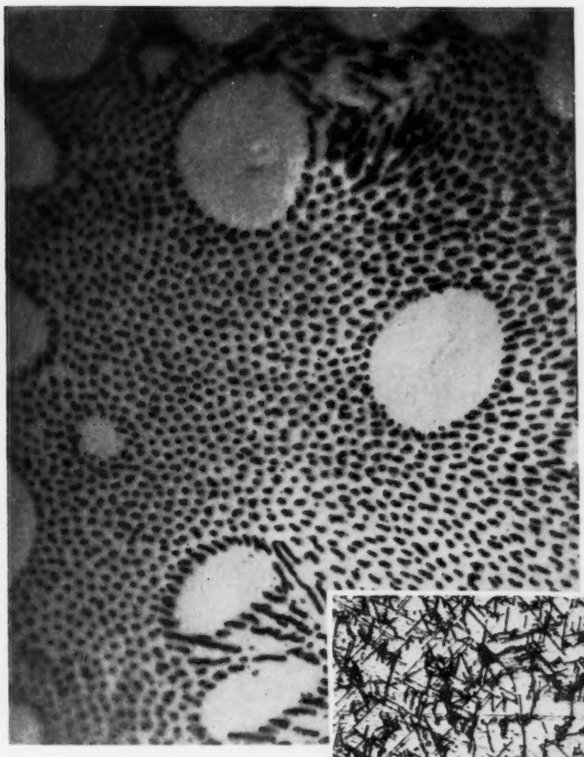
ABOVE

FIG. 6—Iron silicon alloy with 12 per cent Si, as-cast. Barley shell markings decidedly decreasing in number and size. At 100 diameters.



ABOVE

FIG. 7—Commercial iron silicon alloy with 14.5 per cent Si and 0.8 per cent C. Sand cast. Shows eutectic "lamellae" of graphite. At 500 diameters.

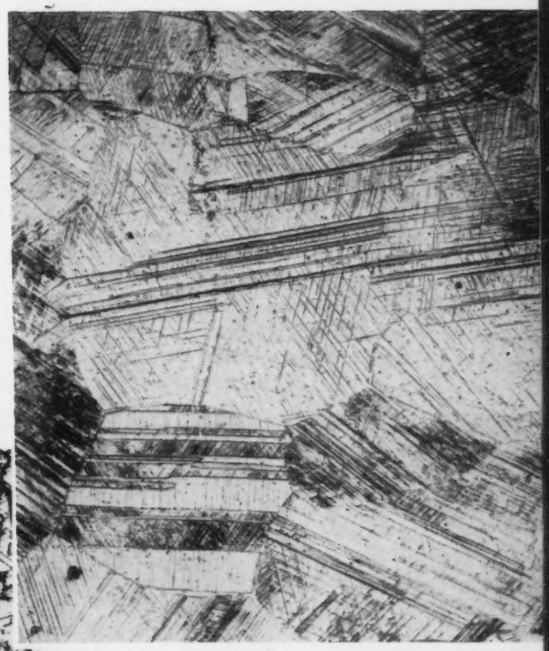


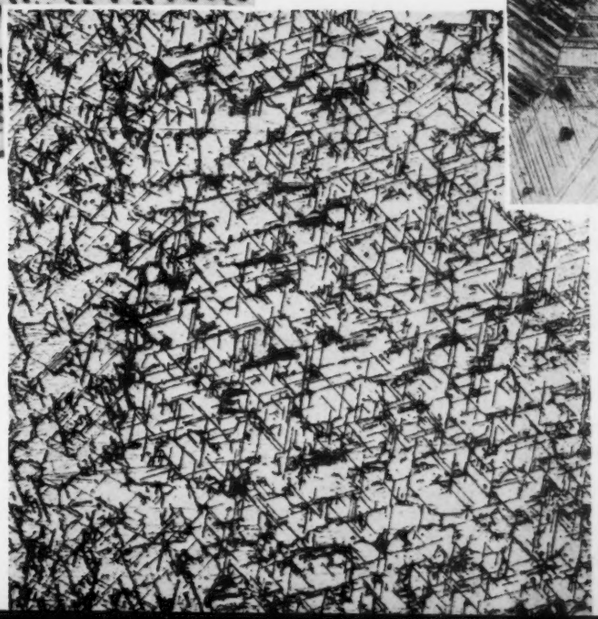
ABOVE

FIG. 8—Same alloy as in Fig. 7, but chill cast. Particles of graphite seem to be spheroidal. However, they are never spheroidal nor lamellar—merely rod-shaped, running in this case in the axial direction of the vertical cast 1 in. bar. At 500 diameters.

BELOW

FIG. 9 — Same alloy as in Figs. 7 and 8, but a much thinner bar. Graphite formed along crystal-planes of the gound mass. The structure might be called "Widmanstaettens", if a name carried an explanation. At 100 diameters.





ABOVE

FIG. 10—Copper-silicon alloy with 5 per cent Si. Rolled and annealed at 800 deg. C. and water quenched. The grains are striated, but not excessively. At 100 diameters.

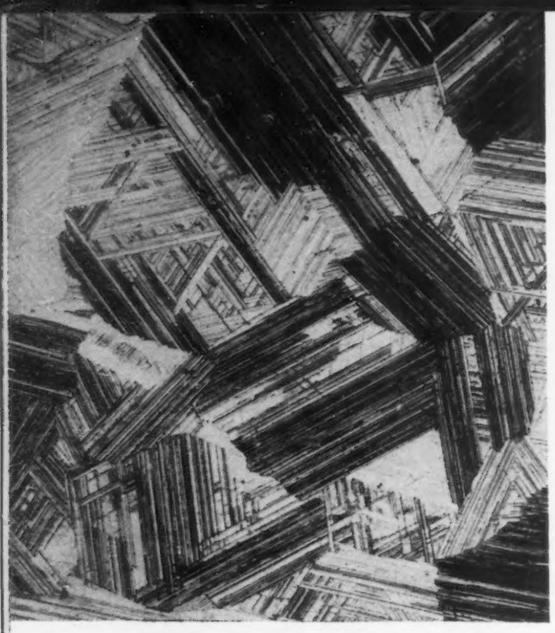


FIG. 11—Same as in Fig. 10, but slowly cooled in the furnace. Extreme striation along the crystalline planes is an intimate combination of the alpha and kappa phases.

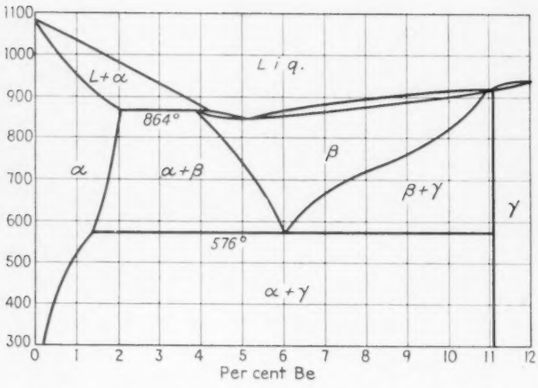


FIG. 12—Constitutional diagram of the CuBe system.

FIG. 13 — Sand cast with 2 per cent Be. Was C. and slightly overaged uniform two-directional to lay-like precipitation compound. At

were composed of grains that were heavily but not excessively marked with fine parallel lines. Furnace cooled they possessed grains that were completely striated and this in three definite directions. In the first state they were soft and ductile, in the second hard and brittle, while the ultimate strength was exactly the same.

Pictures published by this author passed quite unnoticed. The highest metallurgical "authorities" with whom he conferred about this peculiar striation dismissed them as "just a case of multiple twinning."

Not having some of the fine tools of metallurgy at hand (dilatometry, X-rays, etc.) the author paid little additional attention to the striated grains in 5 per cent cupro-silicon until, in 1938, two researchers, Drs. Smith and Anderson, reported the finding of a new phase—the kappa, which forms fine hexagonal plates between the layers of the alpha phase. So finally one of the strange structures became fully explained without the subterfuge of just giving it some proper name.

When strange structures are not considered strange anymore—It is well known that familiarity breeds contempt. The number of strange structures is far larger than might be supposed. If binary alloys only are considered, it is found that a strictly regular structure may consist either of one phase or of two, one of which forms either eutectically (or eutectoidally) or peritectically. Any deviation from that rule

FIG. 16—Wrought alloy of copper with 2 per cent Be, as homogenized and averaged at 650 deg. C. for 24 hr. Precipitate visible, but orientation indefinite. At 100 diameters.

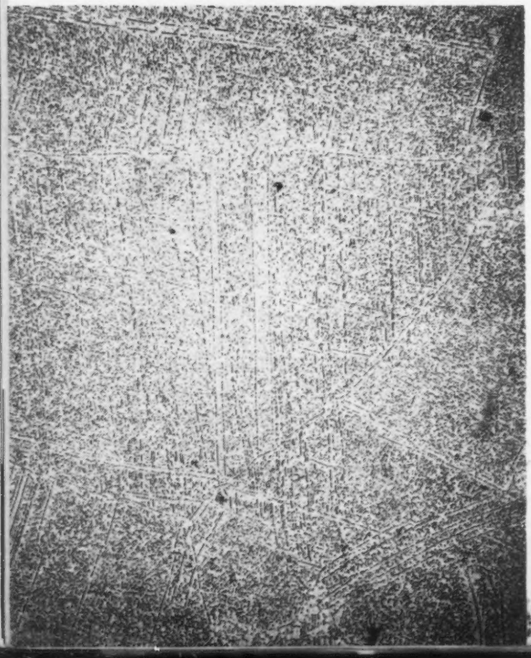


FIG. 17—Same as in Fig. 16 but at 500 diameters. Granules of preciptate well defined and show a definite directional tendency, because formed by coalescence from streamers of fine filaments which pass across grain boundaries.

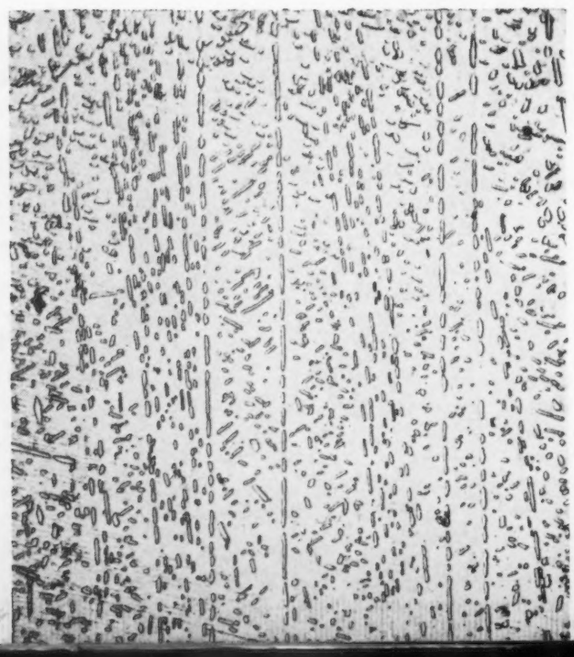
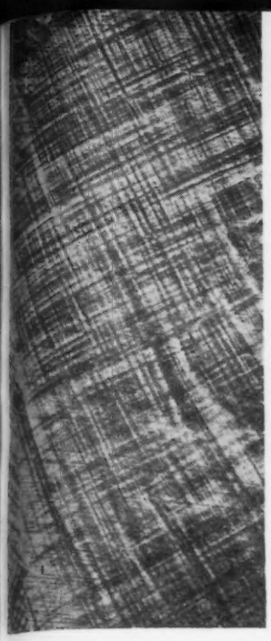


FIG. 18. Same as in Fig. The coalesced particles as to size



copper beryllium alloy homogenized at 800 deg. (at 400 deg. C.) Shows striation in each grain due of filaments of the CuBe 100 diameters.

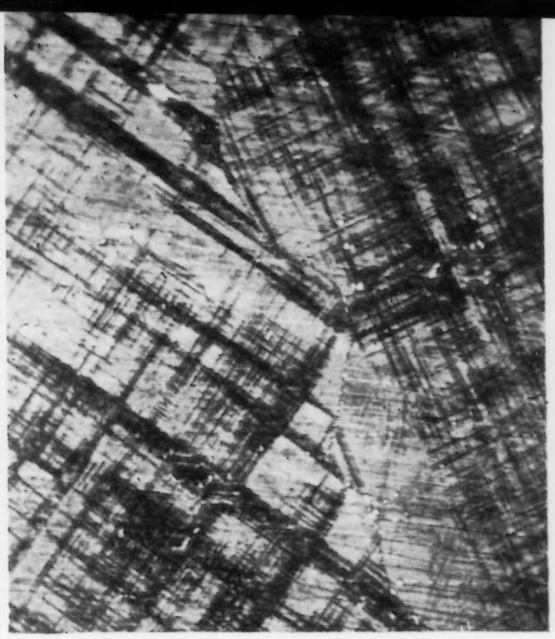


FIG. 14—Same as in Fig. 13, but at 500 diameters. Shows a few granules of beta.

FIG. 15—Chill cast alloy of copper with 2 per cent Be. Shows dendrites of the primary alpha solid solution, a secondary beta and a secondary precipitate in the alpha grains. At 500 diameters.

is due to incomplete equilibrium and cannot be very strong. At any rate the two phases must be separated by quite sharp outlines.

Such regularity is by no means too frequent. Still any irregularity that has been known for decades gets treated as a regularity, as a matter of course. In the case of plain carbon steels the habit has been to speak of pearlite, sorbite, troostite and martensite for over 40 years, and now comes bainite.

But, even the simplest of these specific structures, pearlite, is by no means simple. It is easy of course for a skilled metallographer to select a properly looking spot and obtain a picture of the "typical lamellar pearlite" in a plain annealed carbon steel. If on the other hand he would photograph his sample all over without selecting the proper spot, most of his pearlitic grains would not look like pearlite at all. Some would show stringers of rod-like constituents, others would be reticular, still others plain black, while others again would show only a few widely separated broken lines. Yes, even pearlite is by no means a simple regular structural element as will be shown at a later date.

Ed. Note:—Next week the author concludes with data on permanent and non-permanent solid solutions, and discusses additional strange metal structures.

17 but at 1500 diameters. of CuBe are well defined and direction.

FIG. 19—An alloy of copper with 1.05 per cent Be. The dendritic structure is supplemented by arrays of fine dark lines, where the ultramicroscopic precipitation of the CuBe took place in separate layers. At 100 diameters.

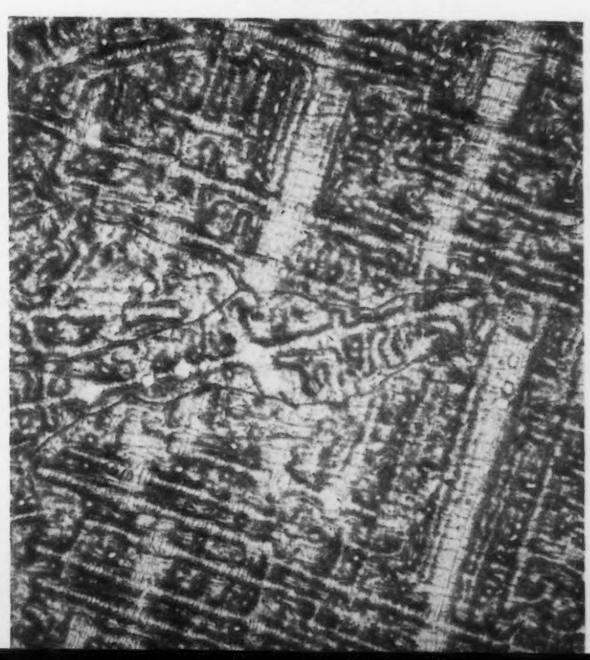
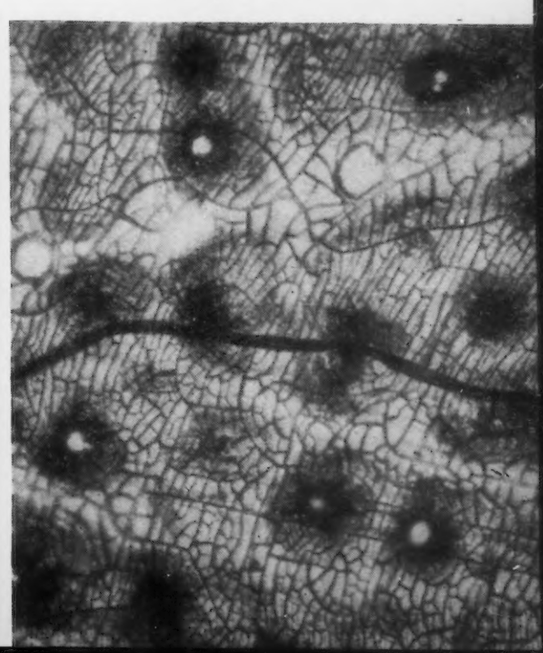
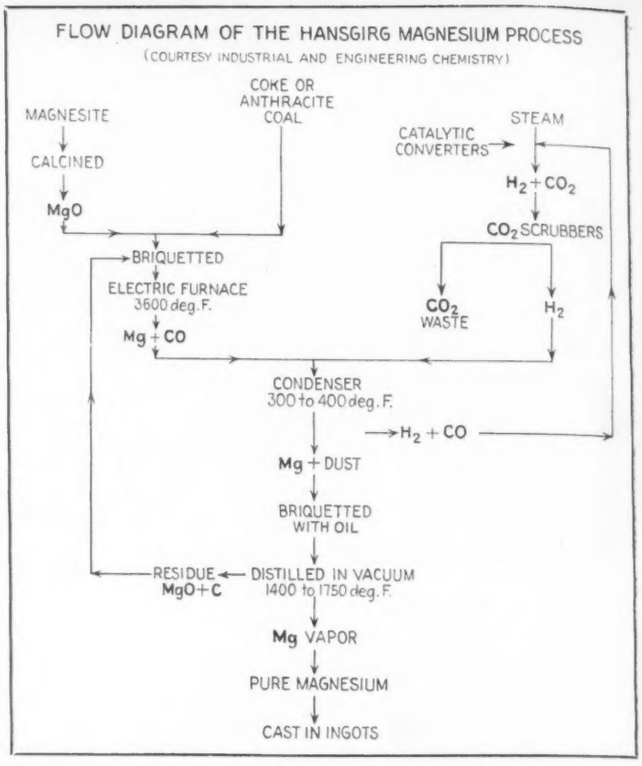


FIG. 20—Same alloy as in Fig. 19, but at 500 diameters. Granules of beta clearly visible.



California Magnesium Plant Starts Production



PRODUCTION of magnesium from magnesite by the Hansgirg process was started experimentally on Aug. 15 in the first unit of the new plant of the Chemical Engineering Division, Todd California Shipbuilding Corp., Los Altos, Cal. Commercial production is scheduled for "sometime in August," but a definite date has not been set and is "in the lap of the gods." Arrangements for RFC financing to the extent of $9,250,000 for the whole plant was announced some months ago, with about one-third of this sum being advanced for building the first unit of the plant, the remainder of the loan to be made available only after successful demonstration of the process in the unit now completed.

This new operation is being watched with keen interest as a source of cheap magnesium. The basic idea of the Hansgirg process is to reduce magnesium oxide with carbon at a high temperature, dilute and cool the reaction products with a cold inert gas, and thus recover metallic magnesium. The reversible reaction $MgO + C \rightleftarrows Mg + CO$ is forced to the right by the high temperature, 3600 deg. F., of a three-phase electric arc furnace. If the reaction produced is cooled normally, the reverse reaction occurs and the yield of metallic magnesium is negligible. Sudden chilling and dilution of the magnesium and carbon monoxide mixture, however, minimizes the reaction between the two and gives a high yield of metal.

The original Hansgirg process employed cold hydrogen introduced directly into the gas stream from the furnace to dilute and cool the mixture suddenly to 300 to 400 deg. F. About 50 volumes of hydrogen were used to each volume of magnesium vapor. Under these circumstances metallic magnesium is precipitated as a dust containing some magnesium oxide and some carbon carried over from the furnace. The dust is bricquetted with oil distilled at 1400 to 1750 deg. F. in a vacuum, and the metal condensed and collected as powder under a hydrocarbon oil. The metallic powder is then melted and cast into ingots. The residue from the distillation, $MgO + C$, is returned to the process. The mixture of hydrogen and carbon monoxide from the condensers is treated with steam in the presence of a catalyst to convert CO to CO_2, which is scrubbed out, and the hydrogen returned to the process.

This is substantially the process as it was developed by Hansgirg of the Austro-American Magnesite Co., and operated at Radenthein, Austria, some years ago. The magnesite used was of the highest purity consistent with reasonable cost. The hydrogen must be low in carbon monoxide and free from water vapor and carbon dioxide.

The present operation at Los Altos will be larger than any of the previous installations. The first unit is a 9000-kv-amp. furnace, with planned ultimate capacity of 15,000 tons per year. Condensation of the evolved magnesium vapor is to be effected by the use of natural gas instead of hydrogen, which, after removal of magnesium and dust, will be passed on to the Permanente (another Kaiser enterprise) cement mill, which is adjacent to the magnesium plant, to be used as fuel in the cement kilns.

Considerable trouble was reported in other plants using the Hansgirg process, the difficulty being in handling hydrogen and highly inflammable magnesium in vapor and powder form. However, similar difficulties have been successfully solved in other industries, such as in the manufacture, processing, and refining of phosphorous and calcium carbide. A number of solutions have been offered to the problem of heat transfer in the vacuum distillation of the magnesium powder.

Operation of the unit at Radenthein is reported to give a power consumption of about 22,000 kw-hr. per ton of metal produced, a recovery of nearly 80 per cent of the magnesium fed as ore in the form of ingots of high purity, and a consumption of hydrogen of about 4 cu. ft. per lb. of metal produced. On this basis, the cost of magnesium production by this method should be very low.

United States production of magnesium is rising rapidly under the stimulus of defense demands, and this new operation is being watched with utmost interest because of the importance of magnesium in national defense and of the basic cheapness of the process for recovering metal from magnesite directly. Output in U. S. in 1935 was 2120 tons, which rose to 5325 tons by 1939. During 1940, the estimated production was 6250 tons, while the 1939 estimated world production totaled 36,159 tons. Plans now under consideration provide for an ultimate U. S. production of about 50,000 tons annually.

CHA

Tool Steel Suppliers	1	2	3	4	5	6
Carpenter Steel Co.	No. 11 Special	Solar	K-W	Stentor	R. D. S.	Hampden
Bethlehem Steel Co.	XX	Omega	Finishing	Tool Room Oil Hardening		Lehigh Die an Tool "H" Temp
Crucible Steel Co.	Sanderson or Crescent Extra	La Belle Silicon No. 2	Crescent Double Special	Paragon or Champion Non-Changeable		H.Y.C.C.
Ackerlind Steel Co.	Blue Label or White Label			Green Label or Violet Label		Victor Hi Chrome
Colonial Steel Div. Vanadium Alloy Steel Co.	Red Star	Silman	Colonial No. 4	Colonial No. 6 or Non-Shrinkable		Crocar
Heller Bros. Co.	Blue Label			Gray Label		
Latrobe Elec. Steel Co.	Extra Carbon	Damascus	E.S.A.	Mangano Special		G.S.N.
Allegheny Ludlum Steel Corp.	Pompton Extra	Ludlum No. 602		Deward or Saratoga		Huron
Jessop Steel Co.	Lion	Magic TR	Fast Finishing	Special Oil Harden-ing or Truform	Extra Tough No. 4	3-C Die Steel
Wheelock, Lovejoy & Co.	Whelco Standard		Whelco Finishing	Whelco Oil Hardening		
Joseph T. Ryerson & Son	VD					L.L.D.
Halcomb Steel Co.	Extra Warranted	Krosil		Ketos		
Universal Cyclops Co.	Cyclops Extra	No. 67	Saturn	Wando		Ultradie No. 1
Vulcan Crucible Co.	Extra	4870	Regal	Non-Shrinkable		Hi-Pro
Firth Sterling Steel Co.	Extra		R.T.	Invaro		Triple Die Steel
Braeburn Steel Co.	Extra			Kiski		Superior No. 1
Midvale Steel Co.	Carbon Tool Extra	Duredge	Finishing	Constant		Diamond Brand
Columbia Tool Steel Co.	Extra	Airex	Double Special	EXL-Die or Oildie		Superdie
A. Milne & Co.	Red Label	MSM	Fast Finishing	Amcoh or K-9		Double Six
Simonds Saw & Steel Co.	Blue Label			Teenax		Die Steel No. 13200
Henry Disston & Sons	Extra	D-29	Celero	Mansil Oil Hardening	Nicroman	812 Die Steel

IN the accompanying tables and chart, which have been prepared by Rolf G. Sartorius, metallurgist, National Lock Washer Co., Newark, N. J., a great deal of technical and commercial information regarding the principal tool steels has been gathered together in a rather limited space for quick reference. Mr. Sartorius has grouped his steels according to type numbers, following the matched tool steel system developed by the Carpenter Steel Co. and exemplified in the nine-diamond diagram, which is reproduced with permission of that company. The general designations of grades are Carpenter's also, but the numbered designations are those used by the National Lock Washer Co.

These tables answer many questions regarding the selection of tool steels. The large table presents the trade names and manufacturers of the nine main classifications of tool steels an auxiliary tables summarize the application, approximate treatment and chemical composition of each type. In add for No. 7 grade, which is ordinary high speed steel, and for N which is a tungsten hot-work steel, substitute molybdenum steels are given in grade Nos. 7' and 8' because of the pr restrictions placed on tungsten alloy steels by OPM. Alte analyses for No. 6 grade are also given, although this ma is not primarily a tungsten steel.

These charts supplement the directory of "1500 Tool St recently published serially in THE IRON AGE and now ava in booklet form.

CHART OF COMPARABLE

GRADE									
3	4	5	6	6′	7	7′	8	8′	9
K-W	Stentor	R. D. S.	Hampden	No. 610 Air Hardening	Star Zenith	Star-Max.	D.Y.O.		Excelo
Finishing	Tool Room Oil Hardening		Lehigh Die and Tool "H" Temper	Air Hardening	Special High Speed	H.M. High Speed	No. 57 Hot Work Special	No. 445 Hot Work	No. 67 Chisel Steel
Crescent Double Special	Paragon or Champion Non-Changeable		H.Y.C.C.	Airdie 150	Rex AA	Rex T-MO	Peerless A	Crescent Hot Work No. 2 or (LaBelle 89)	Atha Pneu (Hot Work)
	Green Label or Violet Label		Victor Hi Chrome						
Colonial No. 4	Colonial No. 6 or Non-Shrinkable		Crocar	O-HI-O Die	Red Cut Superior	Van Lom	Colonial No. 3 or Marvel	Colonial No. 35 or Choice	Par-Exc.
	Gray Label			Die L	Red Label Peerless			Brown Label	Orange Label Chisel
E.S.A.	Mangano Special		G.S.N.	G.S.N. Special	Electrite No. 1	Tatmo	E.H.W. No. 3	Select	X.L. Chisel
	Deward or Saratoga		Huron	Ontario	L-XX	L.M.W.	Atlas A or Atlas B	(EB Alloy)	Seminole Hard
Fast Finishing	Special Oil Hardening or Truform	Extra Tough No. 4	3-C Die Steel	C.N.S.	Supremus	Mogul	2 B (MC) Hot Die	J.J. Hot Work	Top Notch
Whelco Finishing	Whelco Oil Hardening				Whelco High Speed			Whelco Hot Die	
			L.L.D.		High Speed				Shock Steel
	Ketos			Haldi or Marathon	Dreadnaught	V.M.	L.C.T. No. 2		Halcut
Saturn	Wando		Ultradie No.	Ultradie No. 2	B-6	Mo-Tung	Ajax W or B-4	Ajax CR. or Ajax No. 2	Alcoa
Regal	Non-Shrinkable		Hi-Pro	Alidie	Wolfram	Vulmo	Calo Ferro	Extra Chrome or (No. 4 Hot Work)	Q.A.
R.T.	Invaro		Triple Die Steel	Cromovan	Blue Chip	H.M. Blue Chip	L.T. Forging Die	C.Y.W.	J.S. Punch and Chisel
	Kiski		Superior No.	Superior No. 3	Vinco	Mo-Cut	T-Alloy	Hot Die No. 2	Vibro
Finishing	Constant		Diamond Brand		Two Star		Bolt Die Special or Nut Piercer	Bolt Die Regular	
Double Special	EXL-Die or Oildie		Superdie		Clarite	Molyite	Formite	Phoenix	Buster
Fast Finishing	Amcoh or K-9		Double Si	High Production	AMC	M-M-I	3074 Hot Work	Chrome Hot Work	AO 20
	Teenax		Die Steel No. 13200	No. 12150	Red Streak	S.T.M.			No. 47
Celero	Mansil Oil Hardening	Nicroman	812 Die Ste	Croloy	Kutkwik	Di-Mol	Eltun	H.R.W.	Keystone Alloy Chisel

facturers of the nine main classifications of tool steels d the auxiliary tables summarize the application, approxima heat treatment and chemical composition of each type. In dition, for No. 7 grade, which is ordinary high speed steel, and fdo. 8, which is a tungsten hot-work steel, substitute molybdenualloy steels are given in grade Nos. 7′ and 8′ because of theesent restrictions placed on tungsten alloy steels by OPM. Anate analyses for No. 6 grade are also given, although this terial is not primarily a tungsten steel.

These charts supplement the directory of "1500 Tooleels" recently published serially in THE IRON AGE and now dable in booklet form.

T OF COMPARABLE TOOL STEEL GRADES

ADE	6′	7	7′	8	8′	9
	No. 610 Air Hardening	Star Zenith	Star-Max.	D.Y.O.		Excelo
	Air Hardening	Special High Speed	H.M. High Speed	No. 57 Hot Work Special	No. 445 Hot Work	No. 67 Chisel Steel
	Airdie 150	Rex AA	Rex T-MO	Peerless A	Crescent Hot Work No. 2 or (LaBelle 89)	Atha Pneu (Hot Work)
	O-HI-O Die	Red Cut Superior	Van Lom	Colonial No. 3 or Marvel	Colonial No. 35 or Choice	Par-Exc.
	Die L	Red Label Peerless			Brown Label	Orange Label Chisel
	G.S.N. Special	Electrite No. 1	Tatmo	E.H.W. No. 3	Select	X.L. Chisel
	Ontario	L-XX	L.M.W.	Atlas A or Atlas B	(EB Alloy)	Seminole Hard
	C.N.S.	Supremus	Mogul	2 B (MC) Hot Die	J.J. Hot Work	Top Notch
		Whelco High Speed			Whelco Hot Die	
		High Speed				Shock Steel
	Haldi or Marathon	Dreadnaught	V.M.	L.C.T. No. 2		Halcut
	Ultradie No. 2	B-6	Mo-Tung	Ajax W or B-4	Ajax CR. or Ajax No. 2	Alcoa
	Alidie	Wolfram	Vulmo	Calo Ferro	Extra Chrome or (No. 4 Hot Work)	Q.A.
	Cromovan	Blue Chip	H.M. Blue Chip	L.T. Forging Die	C.Y.W.	J.S. Punch and Chisel
	Superior No. 3	Vinco	Mo-Cut	T-Alloy	Hot Die No. 2	Vibro
		Two Star		Bolt Die Special or Nut Piercer	Bolt Die Regular	
		Clarite	Molyite	Formite	Phoenix	Buster
	High Production	AMC	M-M-I	3074 Hot Work	Chrome Hot Work	AO 20
	No. 12150	Red Streak	S.T.M.			No. 47
	Croloy	Kutkwik	Di-Mol	Eltun	H.R.W.	Keystone Alloy Chisel

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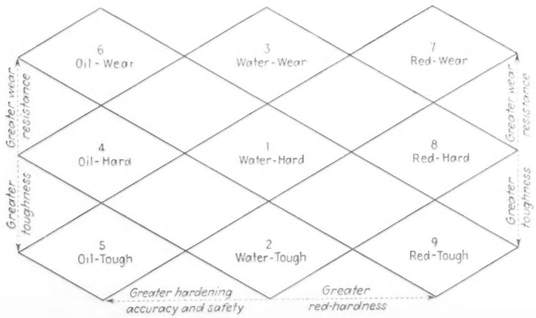


—APPLICATION—APPROXIMATE HEAT TREATMENT—CHEMICAL COMPOSITION—

No. 1—WATER HARD—Straight Carbon or Low Alloy Tool Steel. (Medium Hardness Penetration).

This is the key steel and ALL tools should be made from it unless there is some good reason for going to some special alloy steel.

Drills, Taps, Reamers, Punches, Arbors, Stamps, Bushings, Knurls, Mandrels, Threading Dies, Blanking Dies, Striking Dies, Forming Dies, Bending Dies, Coining Dies, Ring Gages, Plug Gages, Cutters, Hobs, Jigs and Fixtures, Dowel Pins, Locating Studs

Quench 1450° F.—Brine (66-67 Rockw. C) Temper 375° F. (62-63 Rockw. C)

No. 1 ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W
Type Analysis	.70-1.10	.20-.30	.20-.25					
Ackerlind (White Label)	1.10	.30	.25			.20		
Ryerson	1.00	.27	.20			.18		

No. 2—WATER TOUGH—Si-Mn-Water (or Oil) Hardening Tool Steel.

When No. 1 Tool Steel in not TOUGH enough for a job, use No. 2 Tool Steel.

Long Slender Punches, Heavy Duty Perforating Punches, Knock-Out Pins, Clutch, Indexing Pins, Fingers, Stops, Heavy Duty Forming Tools, Heavy Duty Bending Tools, Heavy Duty Coining Dies, Shear Blades, Pneumatic Chisels, Beading Tools, Flaring Tools, Drift Pins

Quench 1550° F.—Brine (61-63 Rockw. C) Temper 300° F. (59-60 Rockw. C)

No. 2 ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W
Type Analysis	.50-.60	.70-.80	1.50-2.00				.20-.40	
Carpenter	.50	.40	1.00				.50	
Bethlehem	.55	.70	2.15			.20	.45	
Colonial	.55	.85	2.10		.25	.30		
Latrobe	.55	.90	1.95		.25	.20		
Jessop	.50		2.00					
Vulcan Crucible								
Columbia	.55	.75	2.00					
Disston	.55	.80	1.30				.50	

No. 3—WATER WEAR—W-Water Hardening.

This is a shallow hardening steel that will resist wear and abrasion; it is not recommended accurately in hardening.

Plug Gages, Burnishing Plugs, Sizing Plugs, Guide Strips, Combination Dies, Sectional Blanking Dies, Nibbling Punches, Notching Punches, Piercing Punches, Reamers, Arbors, Brass Cutting, Die Collars, Forming Die

Quench 1525°—1600° F.—Brine (67-68 Rockw. C) Temper

No. 3 ANALYSIS

	C	Mn	Si	Ni	Cr	Va
Type Analysis	1.30	.30	.45			
Bethlehem	1.30	.30	.40			
Latrobe	1.40	.25	.25		.15	
Jessop	1.30				.45	
Wheelock Lovejoy	1.30					
Universal Cyclops	1.25	.25	.25			
Vulcan Crucible	1.35				.45	
Firth Sterling	1.30	.40			.25	
Midvale	1.45				.75	
Columbia	1.30	.25	.45		.50	
Disston	1.35	.25	.20		.25	

No. 4—OIL HARD—Non-Deforming

Use this steel in place of No. 1 tool steel whenever you want greater ACCURACY or SAFETY in hardening.

Thread Roller Dies, Sub-Press Dies, Lamination Dies, Trimmer Dies, Molding Dies, Forming Dies, Blanking Dies, Precision Tools, Broaches, Cutter Plates, Gages, Master Tools, Spindles

Quench 1400°-1440° F.—Oil (64-65 Rockw. C) Temper 375° F. (61-62 Rockw. C)

No. 4 ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W
Type Anaylsis	.90-.95	1.10-1.60	.20-.40		.50-.60	.10-.25		.50-.55
Carpenter	.90	1.60	.25					
Ackerlind (Violet Label	.90	.30	.25		.50	.20		1.40
Heller	.85	1.30						.40
Latrobe	.95	1.15			.50			.50
Allegheny Ludlum	.90	1.55	.20				.30	
Jessop	.90	1.70	.35			.20		
Halcomb	.90	1.25			.50			.50
Vulcan Crucible	.90	1.55			.25			
Firth Sterling	.90	1.10			.50			.50
Midvale	.90	1.00			.50			.50
Columbia	.90	1.15			.50			.50
Milne	.90	1.15			.50			.50
Simonds	.95	1.50						
Disston	.90	1.15	.35		.50			.50

No. 5—OIL TOUGH

This steel possesses approximately the same toughness as No. 2 Tool Steel combined with non-deforming properties like No. 4 Tool Steel.

Taps, Punches, Blanking Dies, Forming Dies, Trimmer Dies, Thread Roller Dies, Embossing Dies, Forming Rolls, Shear Blades, Punches, Stamps, Swaging Dies, Machine Parts, Clutch Parts, Flipper Pins, Lathe Centers, Pawls, Dogs, Stops, Spindles

Quench 1475°-1550° F.—Oil (60-61 Rockw. C) Temper 300° F. (58-59 Rockw. C)

No. 5 ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W
Carpenter	.75	.30	.25	1.75	1.00			
Jessop	.70			1.30	.50		.25	
Disston	.65	.40	.20	1.65	1.00			

No. 6—OIL WEAR—High Carbon, High Chrome

This is essentially a non-deforming tool steel of extreme wear resistance; it is a deep high compressive strength.

Broaches, Slitting Cutters, Special Taps, Master Tools, Beading Rolls, Forming Rolls, Edging Rolls, Sub-Press Dies, Forming Dies, Thread Rolling Dies, Lamination Dies, Drawing Dies, Extrusion Dies, Blanking Dies, Trimming Dies

Quench 1750°-1800° F. Oil (Air) (65-66 Rockw. C) Temper 400° F. (62-63 Rockw.

No. 6 ANALYSIS

	C	Mn	Si	Ni	Cr	V
Type Analyses	1.80-2.25 2.10-2.25	.25-.35 .25-.50	.25-.30 .25-.30	.50	12.0-14.0 12.0-13.0	.25
Bethlehem	1.65	.35	.30		12.00	
Colonial	2.20	.20	.30		12.00	
Columbia	2.20	.30			10.50	

No. 6′ ANALYSIS

	C	Mn	Si	Ni	Cr	V
Type Analysis	1.50-2.25	.20-.30	.30-.35		11.5-12.0	.20
Carpenter	1.50	.80			12.00	
Bethlehem	1.00	2.00			12.00	
Colonial	1.55	.20	.35		12.00	

No. 7—RED WEAR—18-4-1 High Speed.

This is the ONLY steel suitable for making metal cutting tools that become hot (over 300° F.) in service.

Lathe Tools, Planer Tools, Drills, Taps, Reamers, Broaches, Milling Cutters, Form Cutters, Gear Cutters, Thread Chasers, End Mills, Hot Shear Blades, Hot Punches, Flat Coining Dies

Preheat to 1550° F.; Quench 2300° F.—Oil (Air) (65-66 Rockw. C) Temper 1050-1100° F. (64-65 Rockw. C)

No. 7 ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W
Type Analysis	.50-.75	.15-.30	.15-.30		3.50-4.00	1.00-1.50		18.0-19.0

No. 7′ ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W
Type Analysis	.75-.80	.20-.30	.30-.35		3.75-4.00	1.00-1.15	8.00-9.00	1.50-1.60
Halcomb	.86				4.00	2.00	8.00	
Columbia	.80	.30	.30		4.00	2.00	9.00	

No. 8—RED HARD—Tungsten Hot Work

This is a general purpose hot working die steel for use in the forge shop.

Bolt and Rivet Dies, Gripper Dies, Hot Forming Dies, Hot Extrusion Dies, Semi-Hot Work Dies, Hot Swaging Dies, Hot Piercing Punches, Forging Mandrels

Preheat to 1550° F.; Quench 2250°-2300° F.—Oil (Air) (45 Rockw. C) Temper 1100°-1300° F. (46-43 Rockw. C)

No. 8 ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W	Co
Type Analysis	.30-.45	.30-.35	.25-.35		2.50-4.00	.25-.50		9.00-14.5	
Braeburn	.33	.25	.30		3.25	.40	.25	10.75	
Midvale	.38				3.50			9.50	.20

No. 8′ ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W	Co
Type Analysis	.85-1.00	.30-.50	.15-.30		3.00-4.10				
Latrobe	.90	.35	.25		3.50	.25	.60		
Allegheny Ludlum	.65				3.75	.55	.70		
Universal Cyclops	.95				3.75	.25			
Vulcan Crucible	.90				3.75	.20			

No. 9—RED TOUGH—Hot Work Steel.

This steel is used for hot working tools requiring maximum toughness, particularly Blows or tools containing deep recesses or sharp corners. For short run jobs, this steel same tools as recommended for No. 8 Tool Steel.

Quench 1700° F.—Oil Temper 10

No. 9 ANALYSIS

	C	Mn	Si	Ni	Cr	
Type Analysis	.45-.55	.20-.40	.20-.35		1.10-1.65	.2
Ryerson	.50				1.35	
Simonds	.50	.25			1.40	

TEEL GRADES

—APPLICATION—APPROXIMATE HEAT TREATMENT—CHEMICAL COMPOSITION—

Steel. (Medium Hardness Penetration).

less there is some good reason for going to some special

ming Dies	Plug Gages	Jigs and Fixtures
ding Dies	Cutters	Dowel Pins
ing Dies	Hobs	Locating Studs
g Gages		

Temper 375° F. (62-63 Rockw. C)

LYSIS

Ni	Cr	Va	Mo	W
		.20		
		.18		

greater ACCURACY or SAFETY in hardening.

ing Dies	Cutter Plates	Master Tools
sion Tools	Gages	Spindles
hes		

Temper 375° F. (61-62 Rockw. C)

SIS

Ni	Cr	Va	Mo	W
	.50-.60	.10-.25		.50-.55
	.50	.20		1.40
				.40
	.50			.50
			.30	
		.20		
	.50			.50
	.25			
	.50			.50
	.50			.50
	.50			.50
	.50			.50
	.50			.50

ls that become hot (over 300° F.) in service.

s	Thread Chasers	Hot Punches
	End Mills	Flat Coining Dies
	Hot Shear Blades	

w. C) Temper 1050-1100° F. (64-65 Rockw. C)

LYSIS

Ni	Cr	Va	Mo	W
	3.50-4.00	1.00-1.50		18.0-19.0

LYSIS

Ni	Cr	Va	Mo	W
	3.75-4.00	1.00-1.15	8.00-9.00	1.50-1.60
	4.00	2.00	8.00	
	4.00	2.00	9.00	

No. 2—WATER TOUGH—Si-Mn-Water (or Oil) Hardening Tool Steel.

When No. 1 Tool Steel in not TOUGH enough for a job, use No. 2 Tool Steel.

Long Slender Punches	Indexing Pins	Heavy Duty Bending Tools	Beading Tools
Heavy Duty Perforating Punches	Fingers	Heavy Duty Coining Dies	Flaring Tools
Knock-Out Pins	Stops	Shear Blades	Drift Pins
Clutch	Heavy Duty Forming Tools	Pneumatic Chisels	

Quench 1550° F.—Brine (61-63 Rockw. C) Temper 300° F. (59-60 Rockw. C)

No. 2 ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W
Type Analysis	.50-.60	.70-.80	1.50-2.00			-	.20-.40	
Carpenter	.50	.40	1.00				.50	
Bethlehem	.55	.70	2.15			.20	.45	
Colonial	.55	.85	2.10		.25	.30		
Latrobe	.55	.90	1.95		.25	.20		
Jessop	.50		2.00					
Vulcan Crucible								
Columbia	.55	.75	2.00					
Disston	.55	.80	1.30				.50	

No. 5—OIL TOUGH

This steel possesses approximately the same toughness as No. 2 Tool Steel combined with non-deforming properties like No. 4 Tool Steel.

Taps	Trimmer Dies	Shear Blades	Machine Parts	Pawls
Punches	Thread Roller Dies	Punches	Clutch Parts	Dogs
Blanking Dies	Embossing Dies	Stamps	Flipper Pins	Stops
Forming Dies	Forming Rolls	Swaging Dies	Lathe Centers	Spindles

Quench 1475°-1550° F.—Oil (60-61 Rockw. C) Temper 300° F. (58-59 Rockw. C)

No. 5 ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W
Carpenter	.75	.30	.25	1.75	1.00			
Jessop	.70			1.30	.50		.25	
Disston	.65	.40	.20	1.65	1.00			

No. 8—RED HARD—Tungsten Hot Work

This is a general purpose hot working die steel for use in the forge shop.

Bolt and Rivet Dies	Hot Extrusion Dies	Hot Piercing Punches
Gripper Dies	Semi-Hot Work Dies	Forging Mandrels
Hot Forming Dies	Hot Swaging Dies	

Preheat to 1550° F.; Quench 2250°-2300° F.—Oil (Air) (45 Rockw. C) Temper 1100°-1300° F. (46-43 Rockw. C)

No. 8 ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W	Co
Type Analysis	.30-.45	.30-.35	.25-.35		2.50-4.00	.25-.50		9.00-14.5	
Braeburn	.33	.25	.30		3.25	.40	.25	10.75	
Midvale	.38				3.50			9.50	.20

No. 8′ ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W	Co
Type Analysis	.85-1.00	.30-.50	.15-.30		3.00-4.10				
Latrobe	.90	.35	.25		3.50	.25	.60		
Allegheny Ludlum	.65				3.75	.55	.70		
Universal Cyclops	.95				3.75	.25			
Vulcan Crucible	.90				3.75	.20			

No. 3—WATER WEAR—W-Water Hardening.

This is a shallow hardening steel that will resist wear and abrasion; it is not recommended for tools that must hold size accurately in hardening.

Plug Gages	Combination Dies	Piercing Punches	Brass Cutting Tools	Forming Punches
Burnishing Plugs	Sectional Blanking Dies	Reamers	Die Collars	Forming Rolls
Sizing Plugs	Nibbling Punches	Arbors	Forming Dies	Burnishing Tools
Guide Strips	Notching Punches			

Quench 1525°—1600° F.—Brine (67-68 Rockw. C) Temper 350° F. (65-66 Rockw. C)

No. 3 ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W
Type Analysis	1.30	.30	.45					3.50-4.25
Bethlehem	1.30	.30	.40				.40	4.00
Latrobe	1.40	.25	.25		.15	.15		4.00
Jessop	1.30				.45			3.50
Wheelock Lovejoy	1.30						.40	4.00
Universal Cyclops	1.25	.25	.25					3.25
Vulcan Crucible	1.35				.45			5.50
Firth Sterling	1.30	.40			.25			3.50
Midvale	1.45				.75			4.25
Columbia	1.30	.25	.45		.50			3.25
Disston	1.35	.25	.20		.25			2.75

No. 6—OIL WEAR—High Carbon, High Chrome

This is essentially a non-deforming tool steel of extreme wear resistance; it is a deep hardening steel and has a very high compressive strength.

Broaches	Beading Rolls	Forming Dies	Extrusion Dies	Thread Gages	Reamers
Slitting Cutters	Forming Rolls	Thread Rolling Dies	Blanking Dies	Long Mandrels	Sizing Plugs
Special Taps	Edging Rolls	Lamination Dies	Trimming Dies	Long Punches	Coining Dies
Master Tools	Sub-Press Dies	Drawing Dies			

Quench 1750°-1800° F. Oil (Air) (65-66 Rockw. C) Temper 400° F. (62-63 Rockw. C) 800° F. (58-59 Rockw. C)

No. 6 ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W	Co
Type Analyses	1.80-2.25 2.10-2.25	.25-.35 .25-.50	.25-.30 .25-.30	.50	12.0-14.0 12.0-13.0	.25-1.00			
Bethlehem	1.65	.35	.30		12.00	.30	.80		
Colonial	2.20	.20	.30		12.00	.80			.50
Columbia	2.20	.30			10.50			1.00	

No. 6′ ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W	Co
Type Analysis	1.50-2.25	.20-.30	.30-.35		11.5-12.0	.20-1.00	.75-.90		
Carpenter	1.50	.80			12.00	.20			
Bethlehem	1.00	2.00			12.00		1.00		
Colonial	1.55	.20	.35		12.00	.85	.80		.40

No. 9—RED TOUGH—Hot Work Steel.

This steel is used for hot working tools requiring maximum toughness, particularly tools subjected to heavy hammer Blows or tools containing deep recesses or sharp corners. For short run jobs, this steel can be used with economy for the same tools as recommended for No. 8 Tool Steel.

Quench 1700° F.—Oil Temper 1000° F. (49 Rockw. C)

No. 9 ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W	Co
Type Analysis	.45-.55	.20-.40	.20-.35		1.10-1.65	.20-.35		1.95-2.75	
Ryerson	.50				1.35	.25	.25	1.75	
Simonds	.50	.25			1.40	.25	.25	2.00	

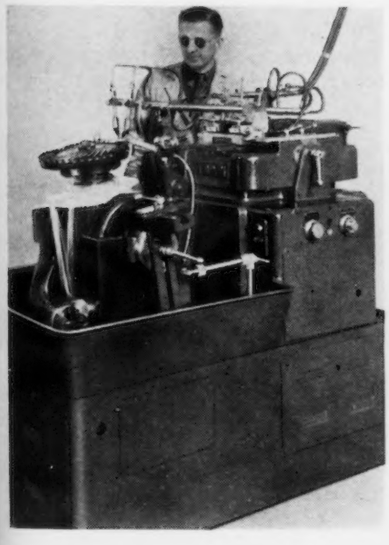
New Equipment . . .

Heat Treating and Process Control

Recent additions to the field of heat treating, carburizing, and combustion furnaces, temperature and program controls, pyrometers, timers, gas and liquid control apparatus, and developments of equipment within this scope are discussed on the following pages.

FLAME hardening the surfaces of medium and small-size bevel, spur, and internal gears, sprockets, and other similar parts is economical when done with the new automatic surface hardening machine built by the *Gleason Works*, Rochester, N. Y. Both sides of the gear tooth are hardened simultaneously without distortion, and each tooth is hardened in exactly the same time and to the same depth as every other tooth in the gear. Bevel gears up to 33-in. pitch diameter can be handled, and the machine is fully automatic in operation, including indexing from tooth to tooth.

The burner column is stationary on the base, the work head swings in trunnions and can be adjusted to any desired angle, also in and out. A change gear actuated roll motion of the head causes the burners to follow the curved teeth on spiral bevel and helical gears. A non-rusting coolant is used, and with the exception of the burners, which are of Gleason design, all gas regulating and mixing equipment is standard. After the operator has chucked the gear and started the machine, it will automatically index, roll, preheat, and harden the gear teeth, stop the motor and shut off the gas flow when all of the teeth in the gear have been hardened.

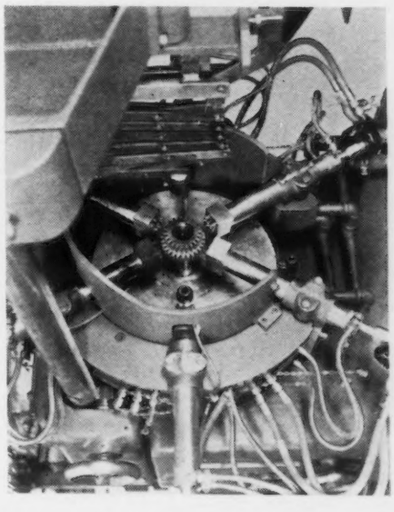


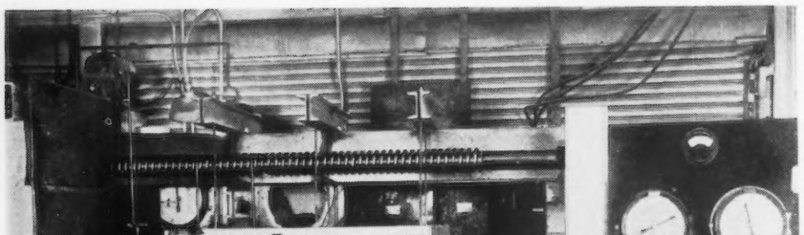
Surface Flame Hardener

EXTENSIVE improvements in design and operation of its flame hardening machine was recently announced by *Fellows Gear Shaper Co.*, Springfield, Vt. The machine has been equipped with an electrical automatic timing device which can be set by the operator to shut down the machine when the desired heating time is reached. Connected with the timer is an ejector, which, when work is held on an arbor, ejects it from the machine onto a transferring arm which, operated by hand, transfers the work from the machine to the cooling tank. The gases are automatically shut off at the same time. All parts of the machine to which the operator is exposed has been covered with water-cooled guards or shields and the torches are shielded to prevent heat transfer to the gas mixing chambers in the torches.

When parts to be hardened are held on centers, the automatic ejector acts as a warning signal for the operation, indicating when the desired temperature and the proper ejection time has been reached. Large housings on the front of the machine cover the gas and water supply pipes, and a water-cooled heat deflector built around the work provides better heating as well as reduced heat loss through dissipation.

Steel, malleable and cast-iron parts can be hardened on this flame hardening machine, which will handle work up to 10½ in. in diameter, with a face width of 2 in. Shafts up to 36 in. long, with a maximum diametral pitch of 4 can be hardened. This six torch, fifteen flame tip machine has uniform heat distribution, controlled depth of heating, controlled heating time, operates rapidly at low cost and with low gas consumption, giving a minimum of distortion to the work being hardened.





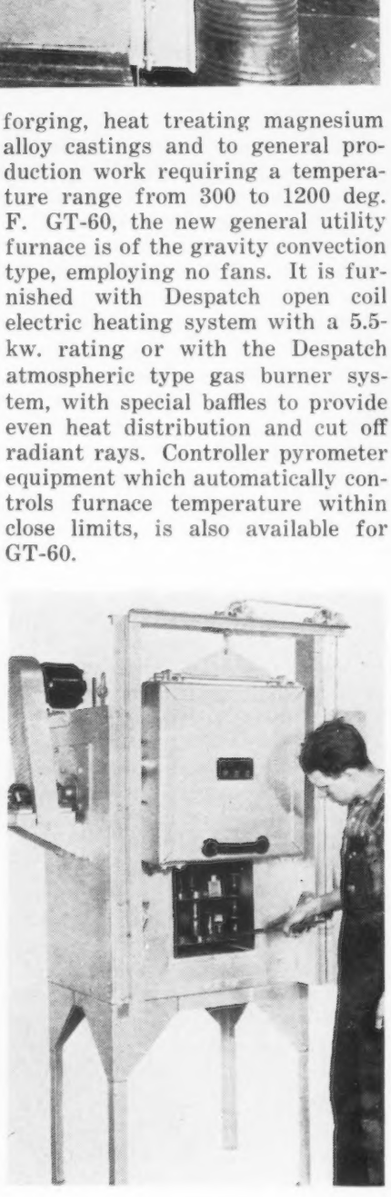
Electric Salt Bath Furnaces

COMPLETELY conveyorized electric salt bath furnaces are now being made by the *Ajax Electric Co.*, Philadelphia division of *Ajax Metal Co.* The illustration shows a 90 kw. furnace heating activated cyanide to produce case depths from 0.001 to 0.050 in. Larger units of this type are made for all heat-treating operations from 300 to 2400 deg. F., including simultaneous brazing and carburizing, tempering, hardening molybdenum high speed tools, annealing, brazing, and heating for forging. Current between the immersed electrodes produces an electromotive field in the bath, causing a continuous visible stirring action, dispersing heat evenly throughout the bath and maintaining constant temperatures.

Guided by overhead conveyor screws, steel parts are submerged in the bath, and travel through at a controllable speed for the duration of their heat-treating period. A step-down transformer supplies high amperage at 5 to 25 volts.

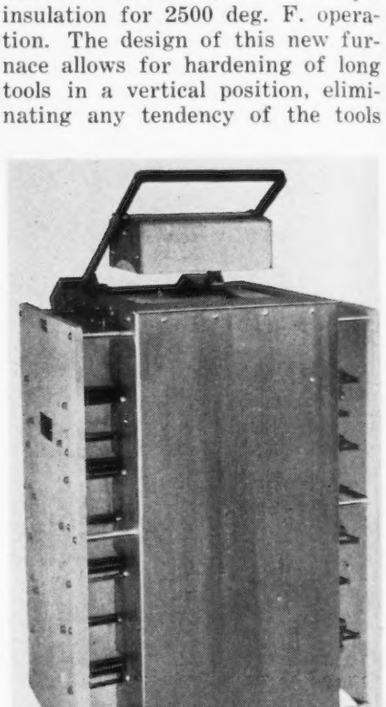
Tempering and Drawing Furnace

THIS improved tempering and drawing furnace, made by *Despatch Oven Co.*, Minneapolis, Minn., is especially adaptable to tool room tempering and drawing work, heat treating aluminum rivets and aluminum alloy castings, preheating aluminum billets before forging, heat treating magnesium alloy castings and to general production work requiring a temperature range from 300 to 1200 deg. F. GT-60, the new general utility furnace is of the gravity convection type, employing no fans. It is furnished with Despatch open coil electric heating system with a 5.5-kw. rating or with the Despatch atmospheric type gas burner system, with special baffles to provide even heat distribution and cut off radiant rays. Controller pyrometer equipment which automatically controls furnace temperature within close limits, is also available for GT-60.



Tool Steel Hardening Furnace

AN automatically controlled neutral atmosphere pit-type furnace for high temperature hardening of high speed steel has been designed by the *Sentry Co.*, Foxboro, Mass. It has a maximum rating of 32 kw. with normal operation running from 8 to 20 kw. per hour. It will heat from cold to 2350 deg. F. in about 75 min., and has ample insulation for 2500 deg. F. operation. The design of this new furnace allows for hardening of long tools in a vertical position, eliminating any tendency of the tools to warp or distort when hot. A silicon carbide muffle over the four heating elements assures uniform temperature throughout the heating chamber.



Box Type Furnaces

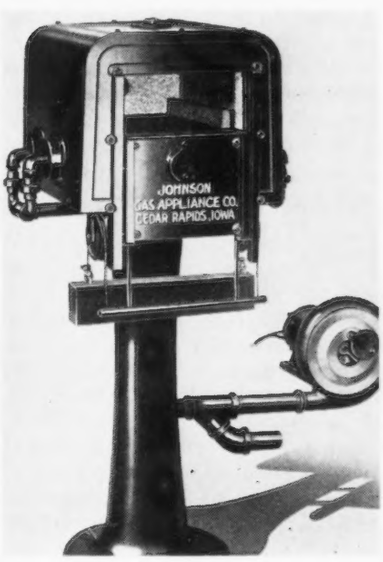
GENERAL ELECTRIC CO., Schenectady, N. Y., has announced a new line of four box-type furnaces for heat treating steel without scale or decarburization, operating at temperatures up to 2000 deg. F. These furnaces are designed for use with Drycolene, General Electric's new atmosphere gas, but other atmospheres can be used. The furnaces range in size from furnace type 1227, with an internal width of 12 in., a working length of 27 in., and a door height

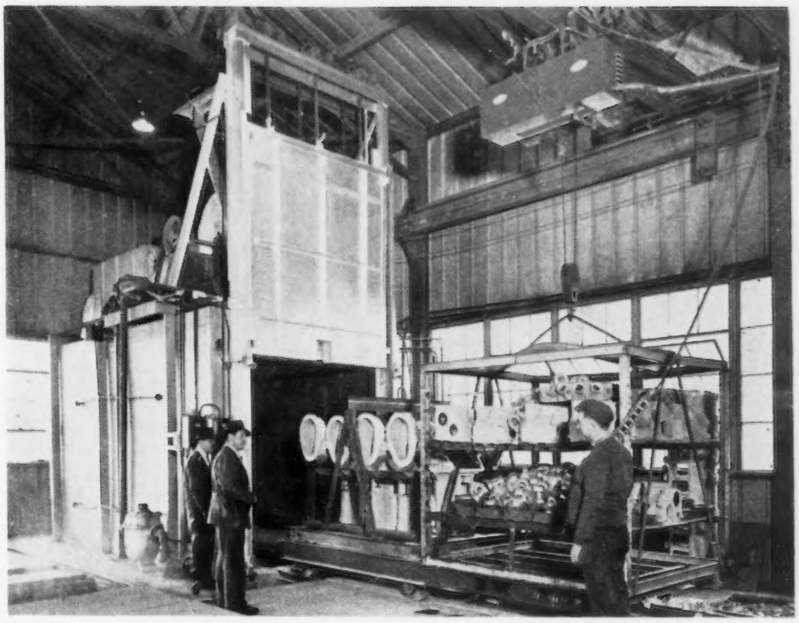
of 8 in., to the large type 2754, with an internal width of 27 in., a working length of 54 in., and a door height of 20 in. A high velocity flame curtain shot down over the door opening prevents the furnace from losing its atmosphere when the door is open, and eliminates the possibility of dirt falling into the burner holes of gas supply pipe for the curtain.

Tool Steel Heat Treating Furnace

A NEW pedestal type furnace, illustrated, for use on work requiring quick heats and high, accurate temperatures for heat treating high speed steels was announced, recently, by *Johnson Gas Appliance Co.*, Cedar Rapids, Iowa. Four Johnson burners give intense, uniform heat, and the unit develops 2300 deg. F. in 22 min. in temperature tests. Carborundum hearth is standard equipment, guaranteeing longer wear with less deterioration.

For quick pot-hardening and melting, Johnson announced another type of furnace, which can be used for lead, cyanide and salt hardening, and for zinc, aluminum and nickel-silver melting. The large combustion space around and below the pot prevents the flame from impinging directly against it, and heavily insulated shields prevent heat loss and insure economical operation. The furnace comes equipped with a steel pot, and is vented to remove products of combustion. The furnace is available in the following pot sizes: 6 x 8 in., 8 x 10 in., 10 x 12 in., and 14 x 20 in.





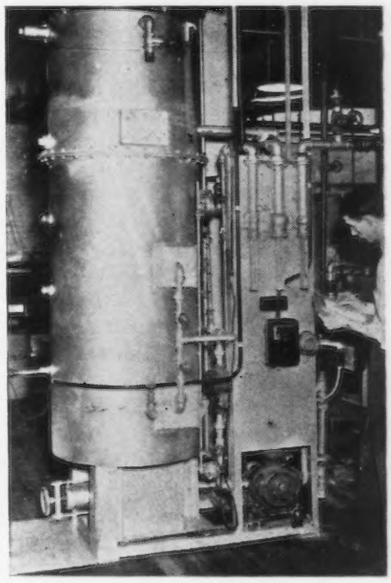
Large Casting Treatment Furnace

A NEW type of heat treating furnace construction arranged with specially designed panels fabricated at the factory, has been recently announced by the *Despatch Oven Co.*, Minneapolis, Minn. Instead of customary refractory or insulating brick construction, the furnace walls are heavily reinforced, horizontally and vertically, steel panels. The interior panel is 18-8 alloy steel, while the exterior of the panel is 16-gage steel between which is packed 8 in. of high grade insulation. Through metal between the panel walls is almost entirely eliminated, and special telescopic joints on the panels automatically take care of expansion and contraction, keeping the furnace tight at all times. Quick assembly and installation of this furnace is a main feature, requiring only eight days to completely assemble the furnace, heating system, temperature and safety control, heat distributing and air circulating systems, and the car system. If necessary, the furnace may easily be knocked down, moved and reassembled or enlarged, by adding more panels.

Designed for solution or precipitation heat treating of aluminum alloys, the furnace is equally adaptable for tempering, drawing, normalizing, and stress relieving alloy steel and castings. The new type of radiant tube convected air heating system on the top of the furnace permits all types of aluminum alloy castings, many of which required indirect heating, to be properly processed. The external heater eliminates completely all radiant heat from the interior of the furnace, essential and desirable for operating temperatures up to 1000 deg. F. Fans deliver air in the work chamber of the furnace at 60 or 70 m.p.h. velocities, assuring rapid heat transfer and uniform chamber temperature.

Drycolene Gas Producer

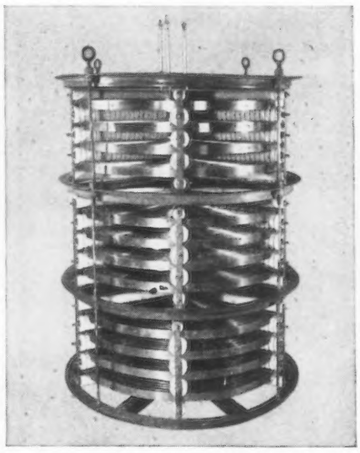
THE Drycolene producer, which makes the new atmosphere gas for heat treating steel products without surface decarburization,



was announced by *General Electric Co.*, Schenectady, N. Y. The gas is claimed ideal for scale free hardening, bright annealing, sintering and electric furnace brazing operation of high carbon steel. Steels hardened in Drycolene have been found to be hard right to their surface and have passed such tests for surface decarburizing as the Rockwell N (Superficial) test, weight change measurements, and photomicrographs. Drycolene producers are available in two sizes, producing 200 and 750 cu. ft. of gas per hr. These self-contained units use hydro-carbon gases, automatically or hand charged. Gas input and output rates are determined by visual flow meters, and, based on capacity operation of the 750 cu. ft. per hr. producer, Drycolene costs from 69 to 93c. per 1000 cu. ft.

Carburizing Furnace

THE new Lithcard atmosphere furnace, manufactured by *The Lithium Corp.*, Raymond Commerce Building, Newark, N. J., completely neutralizes scaling and decarburizing reactions in carburizing operations and provides fast, bright parts that are free of soot, tar, and scale formations. In this furnace it is claimed that reversible reactions of the carburizing cycle are eliminated and steels take on carbon continuously, thus reducing by one-third the time required for normal carburizing action. The parts illustrated were case carburized to a depth of 0.045 in. That on the left, an ordinary gas carburized part, was treated for 8 hr., while the part on the right was treated for 3 hr. in a Lithcarb furnace. The bright finish obtained in this new furnace eliminates the need for sand-blasting or other finishing operations. Model LDU 1230-6 has a temperature range for continuous operation between 1200 and 1800 deg. F., and the working dimensions of the muffles are 12 in. wide x 30 in. long x 6 in. high.

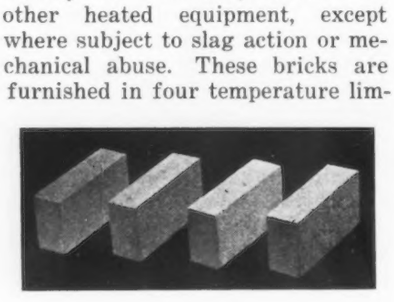


Electric Immersion Heaters

A NEW line of Falcon electric immersion type booster heaters, available in capacities ranging from 10 to 1000 kw. output, was announced lately by *H. O. Swaboda, Inc.*, New Brighton, Pa. These heaters are ideal for applying heat between storage tanks and processing tanks in many coatings and saturating processes, involving the use of heated asphalts, oils, paraffins, waxes, resins, creosotes, varnishes, and insulating varnishes. The Falcon booster heater is restricted to use with any non-conducting material, as bare electric coils are immersed in the material to be heated. The large surface area of the heating element and operation at low watt density per unit of heat transfer surface, minimizes heat gradients between the heater and the material. This unit is made in a variety of sizes and heat capacities, according to the needs of the customer.

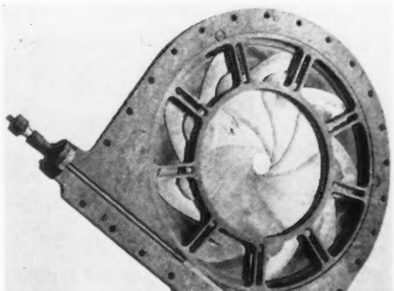
Insulating Fire Brick

JOHNS-MANVILLE, New York, lately announced a new line of insulating fire brick for temperature ranges from 1600 to 2600 deg. F., designed for exposure in a wide variety of furnaces, ovens and other heated equipment, except where subject to slag action or mechanical abuse. These bricks are furnished in four temperature limits: JM-16 for exposed service to 1600 deg. F., and for back-up service to 2000 deg. F., JM-20, JM-23, and JM-26 for exposed or back-up temperatures up to 2000, 2300, and 2600 deg. F., respectively. They are made of a plastic refractory clay and an organic filler, are light, and have high insulating value. This new line of bricks supplements the Johns-Manville Sil-O-Cel series of back-up bricks.



Gas Measuring Valve

IRIS gas measuring valves, made by *York Oil Burner Co., Inc.*, York, Pa., are designed for use in large gas mixing and conditioning plants. By application of these iris valves, feeding gas to the mixing chambers, the resulting mixture can be held to a close B.t.u. content, which is retained by a special division which actually burns a sample of the gas. In response to this device, the iris metering valve is actuated by a hydraulic cylinder and the valve setting is instantly changed to suit variations of the gas condition. Iris measuring valve permits extreme fluctuations in gas requirements being reduced to as low as 5 per cent of the total flow in some operating conditions.



Water Flow Cycling Control

FOR attachment on meters in the initiation of automatic processes, the *Permutit Co.*, 330 West 42nd Street, New York, has recently developed a new type of recycling control. This is so constructed that, after the passage through the meter of a predetermined quantity of water a contact will initiate the automatic cycle. Then the meter resets itself to measure the predetermined quantity of water before

the next automatic cycle is started. Mercury switches are used throughout, insuring good contact and freedom from dust and corrosion problems. No current carrying parts are on the dial. Adjustment of the quantity of water that will pass through the meter between automatic cycles is accomplished by means of an easily accessible dial, visible through the glass face as are the totalizer, test hand and register dial.

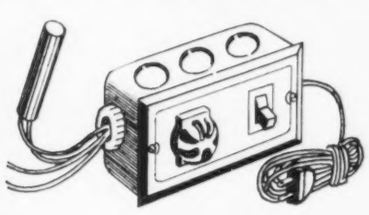
Butterfly Valves

AN improved line of butterfly valves for air, gas, steam, and liquid control, available for hand, hydraulic, or motor operation, is manufactured by *R. S. Products Corp.*, Philadelphia. Internal parts

are machined to assist operation and provide a tight fit between the housing and the vane. Adjustable stops on these valves hold the vane in either of two set positions between open and closed, permitting constant duplication of any opening in addition to full open and tight closed positions. Exterior dials indicate valve position, and valves are made in a range of sizes from 2 to 48 in. for working pressures up to 15 lb.

Cartridge Type Thermostat

RECENTLY, *George Ulanet Co.*, 89 E. Kinney Street, Newark, N. J., introduced Pliotherm, a new controlling thermostat, containing a snap switch and box, pilot light and cartridge type thermostat, 5/8 x 2¼ in., completely assembled and wired ready for installation. It is provided with 3 ft. of asbestos covered nickel stranded wire between



the thermostat and the switch box, 3 ft. of nickel wire for the heater terminal connections, and a 6-ft. rubber cord set at the input end of the switch box.

The instrument is available for operating temperatures of 300, 450 and 700 deg. F.

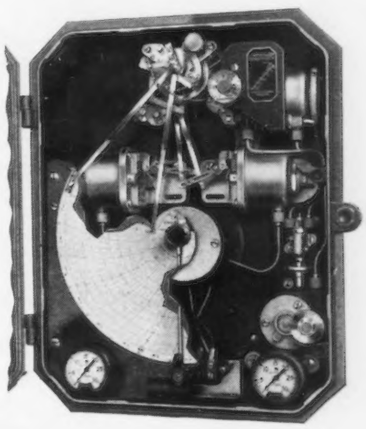
Indicator-Recorder Pyrometer

THIS recently introduced circular chart potentiometer pyrometer, developed by *Brown Instrument Co.*, Philadelphia, is a new type of self-balancing indicator-recorder temperature instrument, employing the nullpoint potentiometer circuit with a new balancing system. This balancing system is continuous, has no galvanometer, is quickly responsive, and sensitive to minute temperature changes. Sensitivity may be adjusted for correct operation on any standard pyrometer range, thus making all amplifiers interchangeable. Pen, pointer,

and slide bar of the recording unit are directly connected to the balancing motor. This instrument is built for shop needs, being protected against dust and corrosion and constructed to withstand vibration and exposure.

Ratio Controller

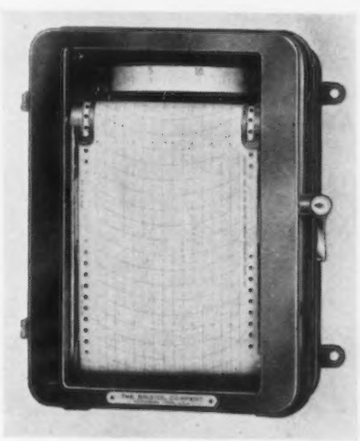
A DIRECT-SETTING ratio controller, developed by the *Taylor Instrument Co.*, Rochester, N. Y., is highly efficient where temperature, pressure, rate of flow or liquid level must be controlled in a desired ratio or differential to another related variable. A simple screw-driver adjustment on a calibrated dial will change the ratio throughout the range of 0:1 to 3:1, direct or inverse. The adjusting system controller only indicates or records, and the controlling system controller may either indicate or record. The adjusting system controller resets the control point of



the controlling system through a linkage arrangement according to a predetermined ratio. Both indicating and recording models are available with all features of the 120R Series Fulscope — fixed high sensitivity, adjustable sensitivity with or without automatic reset, pre-act, or with both automatic reset and pre-act.

Strip Chart Recorder

THE new strip chart recorder, made by the *Bristol Co.*, Waterbury, Conn., offers many changes in construction, including a new case design, chart drive, measuring element, and writing mechanism. These recorders are available for recording in a 6-in. strip chart; d.c. volts and millivolts, d.c. amperes and milliamperes, pressure, liquid level, flow, temperature, motion and for remote recording.

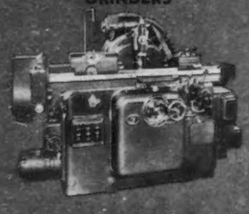


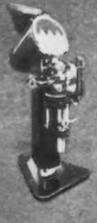
ASAHEL HUBBARD

IN 1835 Asahel Hubbard rode home astride a fine white horse. The horse was a gift from grateful citizens of St. Louis, where Mr. Hubbard had installed a rotary pump to assure the first continuous supply of water to the town. This pump he had transported more than a thousand miles by raft and ox cart, after designing and building it in the Vermont shop, of which today's Jones & Lamson Machine Company is a direct successor.

Jones & Lamson Automatic
Thread Grinder Model TG-615

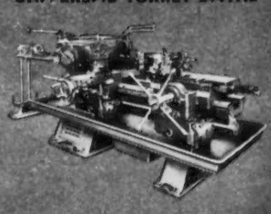
AUTOMATIC THREAD GRINDERS





OPTICAL COMPARATORS

RAM TYPE UNIVERSAL TURRET LATHE



did a job for YOU!

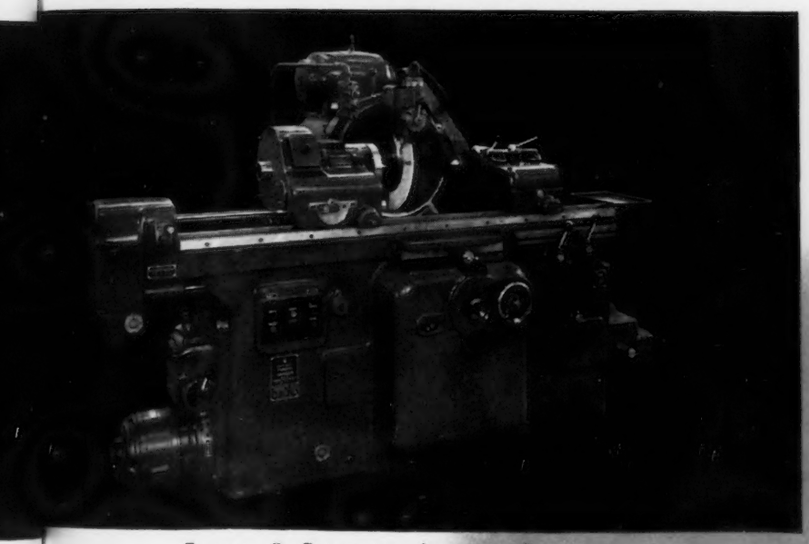
MOST people never heard of Asahel Hubbard. The machines he built no longer run, but in building them he did a job for you. He pioneered advances in engineering, management and precision workmanship that industry takes for granted today. And so did many other men, like Hedge, Kendall, Lawrence, Howe and Hartness whose labors marked the progress of this company and its predecessors.

Today Jones & Lamson engineering is *continuing, broadening and speeding up* a progress which long ago began—*and which has never stopped.*

That is why modern Jones & Lamson machine tool technique is ready to meet today's emergency and help you safeguard profits in tomorrow's competition.

That is why it pays to put production problems up to Jones & Lamson engineers. Inquiries from large companies or small receive prompt, complete and careful study here.

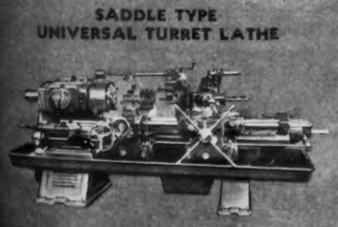
JONES & LAMSON
MACHINE COMPANY · Springfield, Vermont, U. S. A.

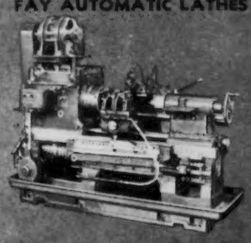


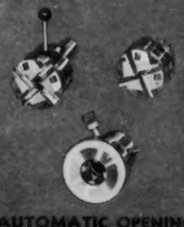
Jones & Lamson Automatic
Thread Grinder Model TG-1245

Manufacturers of

Ram & Saddle Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Thread Grinding Machines . . . Comparators . . . Automatic Opening Threading Dies and Chasers.







PROFIT PRODUCING
MACHINE TOOLS

Assembly Line

• Auto schedule cut differs for various companies . . . Future quotas to be set up on 15th of each month . . . More than 200,000 auto workers may eventually be laid off.

DETROIT — Examination of the curtailment schedule decreed for the auto industry indicates that many factors must have been considered in making the allocations which now will control the output of each plant. Among the Big Three, Chrysler takes the most serious slash, approximately 31.5 per cent under last year's output for the months of August, September, October and November. General Motors' cut will be about 29.5 per cent, Ford's a little more than 17 per cent. Cuts for three of the independents were 38 per cent for Hudson, 23.5 per cent for Studebaker, 12 per cent for Willys, and 10 per cent for Packard.

Nash, because of its output in the corresponding period of 1940, was unusually low, will produce at 105 per cent of last year's rate.

No explanation has been forthcoming for the allocation of 333 units to Crosley, which is at a rate 180 per cent greater than the corresponding output of last year.

The modus operandi of the curtailment program that will eventually affect all civilian goods has now been set up. It will not be on a flat percentage basis but will vary from company to company, depending upon an unknown number of factors—probably including the consideration that someone anticipates a greater demand for some specific product—in the above case, the Crosley car. This same technique has been indicated as impending for refrigerators, washing machines and numberless other products. Types and models will be selected in advance. The only thing that has been overlooked in the automotive scheming is reference to the number of stationwagons, coupes, etc., that may be produced. Actually, now that the other steps have been taken, perhaps allocation by models and body types is desirable.

Other steps that have been outlined include the following: With total output for the next four months set at 817,000 automobiles for private use (compared with 1,113,000 for the same period of last year and 1,560,000 during the four months ended July 31 of this year), the Big Three will adjust themselves immediately to a curtailment of 27.6 per cent. Studebaker, Hudson, Packard and Willys Overland will reduce at once by 20.2 per cent. (That would indicate that Ford, Packard and Willys may rebound a little bit later to reach their quotas. Hudson must reduce sharply to meet its quota, and the others also must reduce further.)

On Sept. 15 the quota for December will be announced. On the 15th of each month thereafter the quota for an additional month will be disclosed. Eventually the curtailment for the year is expected to reach 50 per cent. To do this, progressive declines over the next eight months possibly will cut output to a monthly level of only 25 per cent of normal. That low level of production may be seen during the spring of next year.

SPECIFIC quotas set up for the next four months are:

	1940 Period	1941 Fall Quota
General Motors	511,700	361,815
Chrysler	275,600	188,849
Ford	182,800	151,845
Studebaker	46,160	35,289
Hudson	41,900	25,874
Nash	20,942	21,972
Packard	25,710	23,056
Willys Overland	8,864	7,768
Crosley	185	333

Automobile production during the past week showed a slight drop under the previous week, but was substantially level. It totaled 45,525 units, compared with 45,550 in the previous week and 23,732 in the corresponding week of last year, according to Ward's Reports, Inc. The total number of vehicles produced so far in August is about 144,000, compared with less than 60,000 in the same period in 1940. These 144,000 will be counted in to make the 817,000 quota.

Before last Thursday's meeting the auto industry and parts makers and the labor unions were familiar with what would be proposed in Washington at the session. The figures finally announced, amounting to a 26.5 per cent cut, represent a partial victory, since Leon Henderson's 50 per cent proposal is shoved back for a few months at least.

Even the 26.5 per cent cut, however, brings the country face to face with its first real large-scale unemployment arising from the switch-over to defense work. Unemployment will be roughly proportional to curtailment, although not exactly so, because men are not thrown off jobs as rapidly as the schedule reduces production quantities. An alleviating factor would be a reduction in working hours. A thirty-two hour week is in the immediate offing, and that will be a 20 to 40 per cent reduction in hours, the auto workers have been clocking 40 to 48 hr. each week.

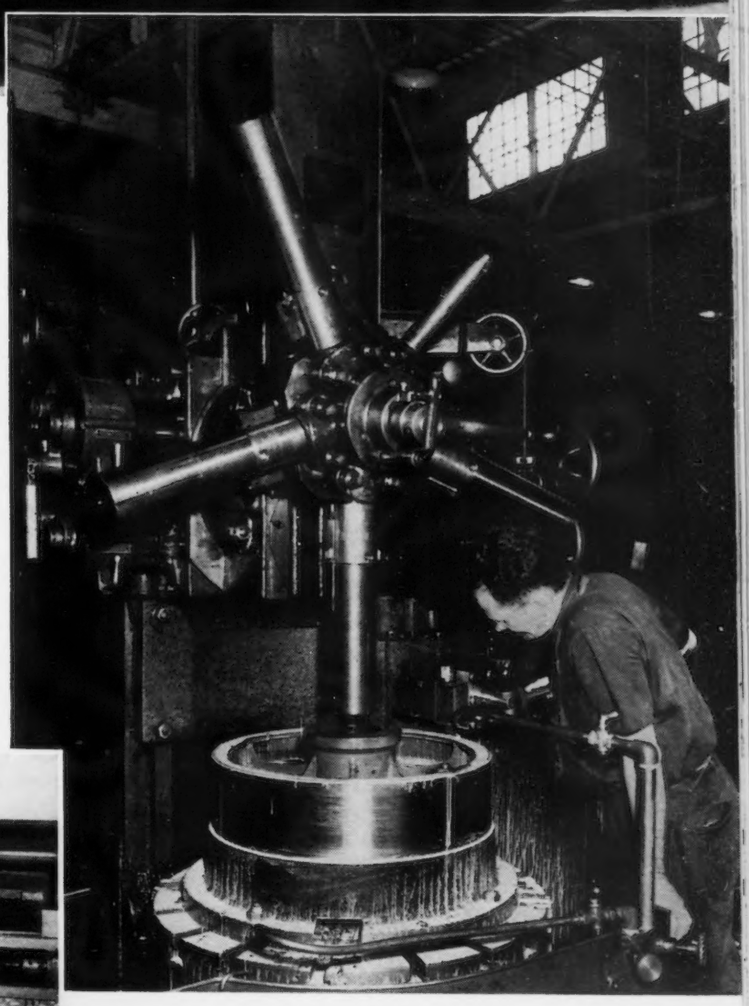
A UAW source foresees the prospect of a layoff of 90,000 men in the next few weeks. (Actually, some workers who were laid off for the model change-over period have not been called back, even though their plants are operating, because they are at the tail end of the seniority list. They are beginning to realize that they are really out of their jobs.) Eventual layoff of close to a quarter-million men is in the wind.

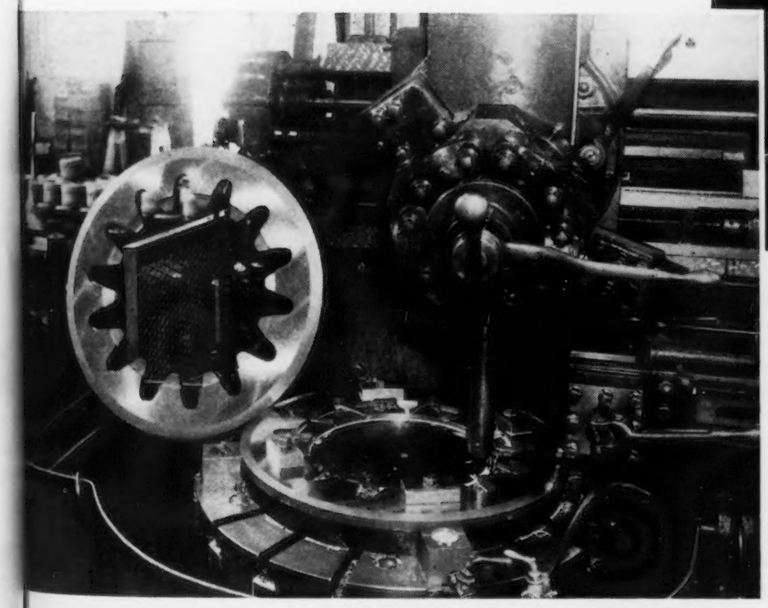
Absorption of the laid-off men by defense plants will be halting and slow. Authorities don't see much hope for reemployment for even 100,000 of them until next summer.

The industry and the labor unions will have to make some compromise between seniority rights of the unemployed and the rights of possession by those who have recently been placed on new defense jobs. Most of the newcomers have just been trained for their tasks by NYA, WPA, or training-within-industry programs. Suddenly lush in $40 to $70 a week jobs, they won't

FASTER TANKS... FASTER!...

DESIGNING faster tanks is one thing—rolling them off the assembly line at a faster rate is another. We must have faster tanks—a lot of them—and in a hurry. That is why there are great numbers of Bullard Vertical Turret Lathes working 24 hours a day on tank parts—like the ones illustrated here.





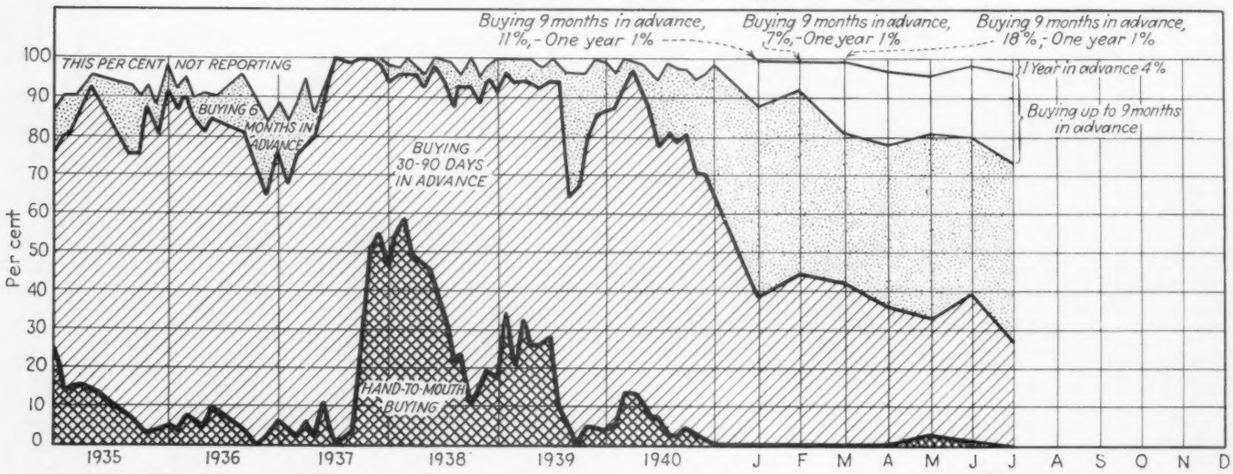
A Bullard V.T.L. with its main and side heads cutting simultaneously, saves time ON cuts and BETWEEN cuts. And—this is highly important—it is about the most versatile machine on the market.

BULLARD

THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

BUYING TRENDS IN METAL-WORKING FIRMS IN DETROIT



Data from PURCHASING AGENTS ASSOCIATION, DETROIT; Data cover wide industrial field, including stove, refrigerator office equipment, steel, auto parts, accessory, auto plants, etc.

The Iron Age

easily give in to the idea of being "bumped" off their jobs by an auto worker whose contract (with the same operating corporation) says he is entitled to a job because he has been in the industry 15 or 25 years.

A clash is inevitable. It is not a pleasant thought, but one advanced by a responsible individual in this industrial community, that we must choose between the unemployment of thousands of disgruntled seniority-holders and "a pack of dispossessed wolves."

PART of this serious problem arises from the undeniable fact that we are short of important basic materials or of their production facilities. Another part of the problem is created by the equally undeniable necessity for conservation of materials or for stock piling to be sure that defense industries have every piece of material and equipment that they need. But another part of it, we are told, is just a "pinching"—or an attempt to shock and jolt us into full realization of the fix we are in.

The idea that we need a shock or a jolt keeps cropping up with discouraging regularity. Day-to-day contact with small manufacturers is convincing proof that some of them have already been jolted almost out of existence, and there really doesn't seem to be any need for carrying the jolting business too far.

The suggested remedy, that they seek defense contracts or sub-contracts, will help some of them, especially when they learn how to sell their services and shop facilities. However, there are many others that are admittedly out of luck because there is no demand for their services. Conditions vary, but in this area stamping plants don't seem to stand a ghost of a chance of getting any work to do. On the other hand, there is an extreme shortage of automatic screw machines, and anyone with this kind of equipment can get plenty of work.

The OPM office in Detroit has approximately 1300 manufacturers on a waiting list for defense work. It has just placed with responsible firms most of the sub-contracting work which was found necessary on one of the aircraft engines being produced in this area. It took only about a week to find all the production facilities that were necessary. An OPM official has gone so far as to say that there are ample facilities, but not enough contracts.

It is not loose talk to accuse Washington of trying to apply the shock cure. Leon Henderson said that was what he was trying to do in his "shock statement" about the 50 per cent curtailment, immediately, for the automobile industry. This industry, by the way, had already taken on so many defense contracts that it was being accused of hogging all the business.

THERE is very real danger that within a matter of a few months, at most, the shock cure will prove fatal to a large number of the patients.

The doctors in Washington might begin now to try to analyze what will happen after the "pinching" program has really done its work and put several hundred thousand workers out of their jobs.

An industry-wide authority in one manufacturing field has analyzed the steel tightness on the following basis:

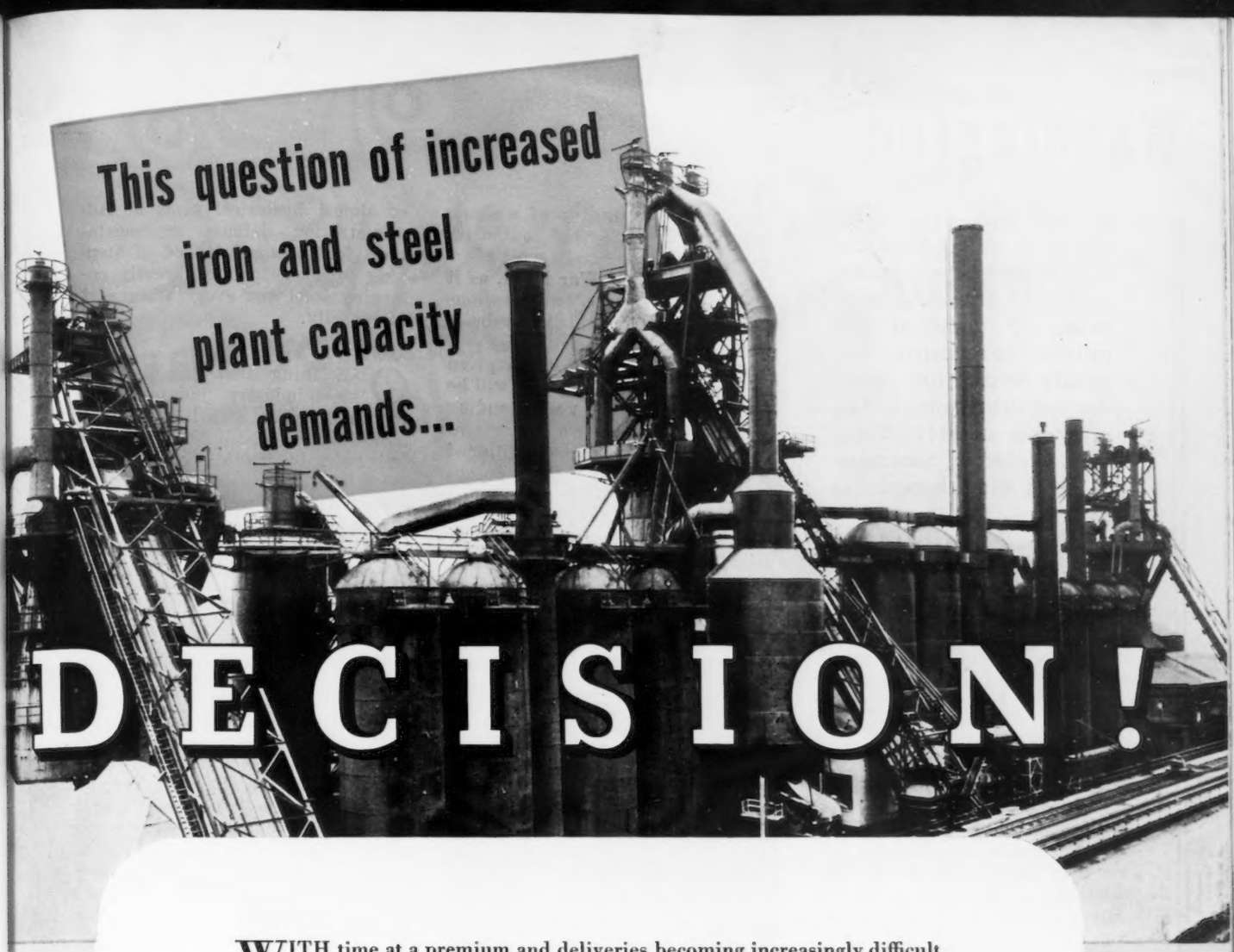
1. At about the time of Hopkins' trip to Moscow some "extra special" rush orders bearing little red tags were put in ahead of all priorities orders. Being right at the top of the heap, these pushed all the others backwards and caused an additional tightening up and bunching.

2. Navy and arsenal backlogs are being created far in excess of normal practices in industry where similar manufacturing operations are carried on. The Navy insists on having all steel on the ground for a ship before it lays a keel.

3. Underestimating available supplies and overestimating prospective needs is a too-common fault, on defense jobs as well as on civilian jobs.

4. This authority joins with others in saying that there is a trend to the reduction of civilian supplies to "force enough hardship and suffering" to make people realize the seriousness of the situation.

5. He adds support also to the idea that the restriction of supplies for civilian use is aimed at the admitted goal of forcing more firms to take defense orders.



WITH time at a premium and deliveries becoming increasingly difficult, the question of who will do your construction work requires prompt decision.

Time ordinarily lost on preliminary negotiations can be saved by placing your job in the hands of a firm in whose ability, experience and integrity you have complete confidence.

During the past 36 years Arthur G. McKee & Company have earned the confidence of the iron and steel industry throughout the world.

An increasing number of iron and steel men are commissioning us to execute their new projects or rebuilding programs, permitting us, where possible, to duplicate designs of recently completed successful plants. By such duplication McKee can save you engineering time and can place orders immediately for many items on which delivery is critical.

In rebuilding existing units McKee arranges to have all essential material on hand before construction starts in order to eliminate delays and reduce non-productive time of the unit to a minimum.

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Washington

• Steel industry seen caught in confusion which hampers entire national defense program . . . Even a 200 million ton ingot capacity could not meet the requirements . . . U.S. may be overlooking own defense machine to send aid abroad.

WASHINGTON — It is evident from reports coming to Washington that the steel industry has been caught in the confusion which, according to Senator Byrd, Democrat, of Virginia, "exists to such a degree . . . as virtually to stymie the whole defense program."

There is puzzlement over the order of production. A considerable part of the difficulty goes back to the complaint that has been made and reiterated many times, and emphasized by the Virginia senator and a score of other sources—conflicting and overlapping authority. The row between OPM and OPACS is much more bitter than the Administration has indicated. Its policy has been to minimize the differences between the two agencies. Senator Byrd said that it is deeper than a "mere jurisdictional argument." Reflecting what is in the minds of many, the "battle behind the scenes," he charges, "involves an attempt on the part of some who would change the form of our government under the guise of national defense." There can be no question that this suspicion plays a part in the confusion that exists and contributes to the lag in defense production which the Senator analyzed so critically, painting a picture that is extremely depressing, to say the least.

Finally there is a move being made to reorganize the entire defense program, which apparently looks to the setting up of a single head with centralized authority such as was found to be most effective during World War No. 1, as it is called. Even here, two questions are raised: (1) will there be a single organization setup; (2) if so, will the directing head by given the necessary authority and will he have the necessary understanding and courage to perform his tremendous job? Names being mentioned as a possible head definitely do not inspire confidence that such will be the case. There is the smell of not only inefficiency but of politics, the determination to yield no power to any but those who share fully in the Administration's political philosophy with its refusal to declare a moratorium on "social gains" and its striking timidity in dealing with labor and strikes that are wrecking production ruthlessly in the face of almost hysterical pleas of Administration defense representatives for the urgent need of stepping up of output, of greatly enlarging steel and every other sort of capacity.

Photo by Harris & Ewing

LEASE-LENDER: This is Oscar Cox, general counsel for the Lease-Lend Administration in which much war material and equipment has been shipped to Britain and other democracies.

ONE thing that troubles the steel industry, judging from reports in circulation here, is that it should be allowed to exercise judgment in turning out orders. While obviously no complaint is or should be made respecting priority ratings once schedules have gone to the mills, it is being urged that rollings could be made more orderly. That would not only benefit defense production, but would afford aid to civilian needs, which are being threatened with a crushing force to them and the nation's economic system. Defense output can be better attained and civilian supplies at least apportioned more liberally if schedules are arranged so that unnecessary changes of rolls and other dislocating elements are avoided.

Steel, too, is troubled over the part it and other industries of the country are being called upon to play for a nation that rather grandiosely—and it is hoped that disillusionment won't follow — is setting itself up as the "arsenal of democracy." Piled into the mills and industry generally are huge requirements that cannot possibly be turned out with the expedition that is demanded. It affords excuse to claim an inadequacy of capacity, to project a program of ever-growing expansion, yet it does not make possible the production and deliveries from the arsenal of democracy that are immediately asked for; nor would a 200,000,000-ton steel capacity do the trick. The role is becoming an impossible one.

WITH the black clouds of war undoubtedly hovering nearer our own shores there is need to look more realistically after its own defense needs, aiding to the hilt beyond that for Britain or other countries that are on our own side. Otherwise, there is growing fear that the United States will find that it will not get out of the bog it is in in the defense situation. Confidence is felt that a one-headed, courageous and intelligent direction will perform this necessary feat,

A Supply Line Like This

KEEPS YOUR PRODUCTION LINE RUNNING

Above: Sharpening a shell end milling cutter. Here the operator manipulates the machine where he finds the greatest convenience — using the rear left-hand controls.

Right: CINCINNATI No. 2 Cutter and Tool Grinding Machine.

TO keep your production line running continuously and efficiently, supplies of all kinds must arrive in a constant stream — materials, partly fabricated parts, lubricating oils, sharp cutters. Eliminate any one of them, and production stops abruptly. You can be certain that the supply of sharp cutters will not fail if you have CINCINNATI No. 2 Cutter and Tool Grinders on the job.

These machines have many features which aid in sharpening cutters **quickly and correctly:**

Anti-friction table slide.

Two-speed hand table control.

Dual rear controls (both sides of bed.)

Large easy-to-read clearance setting dials.

Shock-proof table stop and reverse dogs.

The complete story will be found in publication M-962. We will gladly send a copy to you upon receipt of your request for one of them.

CINCINNATI

THE CINCINNATI MILLING MACHINE CO. CINCINNATI, OHIO, U.S.A.

TOOL ROOM AND MANUFACTURING MILLING MACHINES . . . SURFACE BROACHING MACHINES . . . DIE SINKING MACHINES

and without depriving properly arranged aid for Britain. The time has come for a halt on disorderly dispersion of production to the cost of our own interests. The time also has come for a halt on the eternal conception of new projects whose value lies more in their apparent splendor than in the service they would perform—the St. Lawrence waterway, for example.

What is the use of building up steel capacity if once it has been created, some unnecessary scheme is hatched that will not only absorb the increased capacity but will, without end, senselessly call for more and still more capacity. The significance of this practice once the emergency is over is too evident to require comment. And while the immediate problem is to win the war, since the United States is in it, it is also desirable to look to the future to see that the things that a republic represents are not crushed.

All this would help greatly to "awake America," whose alleged drowsiness over the war situation has given the Administration a bad case of insomnia.

Photo by Harris & Ewing

LAST 100 DAYS: U. S. industry is "about 100 days from real production" of defense supplies. John D. Biggers (above), of the OPM, told the House Military Affairs Committee. Every industrial manager and worker, he said, should realize that the nation's safety may depend on what they do in those 100 days.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

65,000 Consumers of Strategic Metals Get Questionnaires

Washington

• • • **The OPM and the Bureau** of the Census have mailed out early this week 65,000 questionnaires to consumers of strategic metals, seeking information on inventories and consumption for use in an administrative check-up by OPM's Priorities Division.

Prepared by a joint committee representing OPM, OPACS, the Bureau of Mines and the Census Bureau, the questionnaire asks for data on quantities on hand and uses made during August of antimony, cadmium, chromium, cobalt, copper, ferro-alloys, iridium, lead, manganese or spiegeleisen, mercury molybdenum, non-ferrous alloys, tin, vanadium, tungsten, zinc and scrap metal containing any of these components.

Concrete and Wood to Replace Steel in U. S. Housing Projects

Washington, D. C.

• • • **Instruction for conservation** of defense materials through substitutions for important metals in future USHA projects have been issued by the United States Housing Authority. Substitutes for steel, copper and bronze have been recommended, and the use of aluminum has been prohibited.

Iron and steel have been suggested in preference to other metals, but wood or other substitutes should be utilized where practicable. A reduction in the quantity of structural steel through the use of reinforced concrete or timber members has also been urged. From one-half to one ton of metal would be saved in the construction of each USHA home by the use of suggested substitutes.

Army To Use Steel Spoons

Washington

• • • **Redesigned by the** Quartermaster Corps in order to eliminate zinc and nickel, Army forks and spoons hereafter will be made of plated steel. Purchase of 160,000 of each of these articles has just been authorized and, it was stated, will conserve 10,000 lb. of nickel and more than 9000 lb. of zinc.

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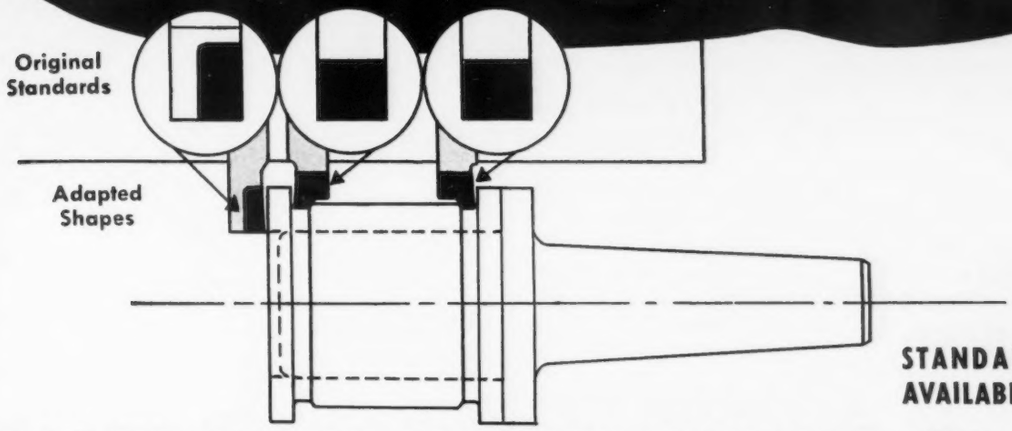
Saves 6 to 8 Weeks on
CARBIDE TOOL DELIVERIES!



QUICKLY ADAPTS CARBOLOY STANDARD TOOLS TO FORM CUTTING . . .

To eliminate weeks of waiting for special form tools required to machine their bushings and bearings, Federal-Mogul Corporation—well known Detroit manufacturers, evolved this simple, fast method:

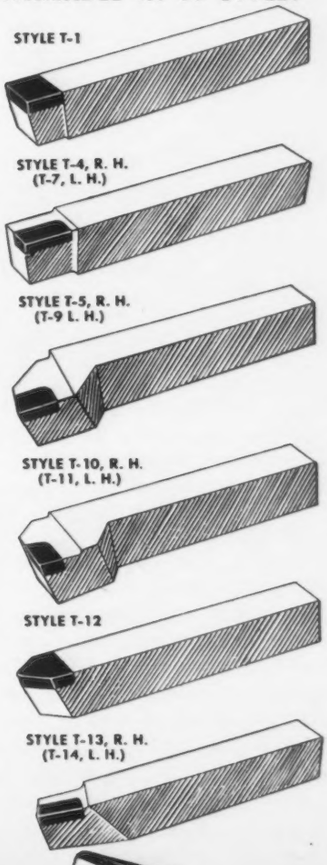
Instead of ordering form tools, Federal-Mogul Corp. orders Carboloy STANDARD-STOCK tools and quickly adapts them to meet their special requirements.

The example illustrated above is typical. The tool at left is adapted from a Carboloy Standard Style 4. Federal-Mogul orders this tool from stock and grinds the slight offset required. The two tools at right are adapted from Carboloy Standard Style 1. Federal-Mogul orders these from stock and grinds the ends to the form shown. All adaptations are made in the Federal-Mogul tool room.

In setting up this "help yourself" plan, Federal-Mogul last Fall checked all of their form tool drawings against Carboloy standard tool specifications. All standard tools that could be readily adapted to their special form requirements were so identified. Standard tools were then stocked and made immediately available for current demands.

Through this simple procedure form tools get on the job FAST—at Federal-Mogul. May we help you get the same fast results? Send for Catalog GT-129.

STANDARD TOOLS ARE AVAILABLE IN 10 STYLES



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WEST COAST

• Agitation for price adjustment between merchant and reinforcing bars reported . . . Extension of scrap search to Mexico meets little success . . . Coast aircraft committee meets on standardization proposals

SAN FRANCISCO—Heat generated by friction between the frozen Pacific Coast prices for reinforcing steel and merchant bars might well lead to a thawing of the reinforcing steel price structure of the OPACS.

The OPACS has signified its willingness to correct inequities in the price structure and has demonstrated the elasticity of the freezing order in concessions to high cost Eastern producers. If adjustments are to be made as between producers, some Coast steel men suppose that corrections of relative product prices may be in order.

Before the defense emergency, reinforcing steel was the bread and butter that kept Coast mills operating. Three independent Coast mills and local operations of two Eastern companies scrambled for this tonnage when there was a famine of other orders with the result that the published price structure could hardly step down fast enough to keep pace with special concessions. Concrete construction flourished, partly because material for structural steel frames had to be brought from the East. Huge dams, reclamation and flood control projects, and ambitious highway and bridge projects provided a relatively active market for home-rolled concrete reinforcing bars and competition was keen . . . perhaps too keen.

Meanwhile, demand for merchant bars was light but steady, and this price structure managed to keep on the straight and narrow path, erring only when pushed by interjobber rivalries. Moreover, merchant bar tonnages booked would have been insufficient to carry the overhead of any mill.

Conditions had improved somewhat when the freezing order came, but there was still a crevasse of 30c. a hundred pounds between lowly reinforcing bars and lofty merchant bars on the consumers' price list. An additional published concession of 25c. on reinforcing bars was being made to jobbers, and this, too, was frozen.

Any momentary glee industrial reformers may have felt in being able to imprison steel producers in a price bog has faded considerably. The demand for reinforcing steel has soared under the impact of defense construction, but orders for merchant bars have also become plentiful. Capacity of Coast mills is insufficient to satiate the market's appetite for both. The willingness of mills to book reinforcing steel orders for defense projects when they could be devoting the same capacity to producing merchant bars at a substantially higher price is a fine tribute to their patriotism. However, a tendency to roll merchant steel for secondary defense demand rather than reinforcing steel for secondary defense demand is entirely understandable. If there is any fault, it lies in a price structure frozen out of line.

TODAY, little or no reinforcing steel is available on the Coast for government housing projects, reclamation projects, flood control projects, highways, and schools . . . let alone private industrial and residential building. An A-1-A priority is no guarantee of immediate delivery.

Were it not for the impact on employment and, in the case of private building, suppliers of products other than steel, some opinion might hold that this type of work might be saved to serve as a cushion after the emergency is over; but there is another aspect. With frozen price lists commiting them to sell to jobbers at 25c. less than to consumers, and with direct-to-consumer large tonnages abundant, mills are not rushing to fill the bare cupboards of jobbers' warehouses. Jobbers entirely dependent on reinforcing steel face a critical situation.

It is true that allocations of tonnage can be, have been and will continue to be made, but compulsion will not solve the shortage in the categories described above. Whether General Preference Order M-21 forces rolling of reinforcing bars rather than merchant bars when orders for the former command a higher priority is a matter for attorneys. Attention will no doubt be given to Paragraph (b) (7) (ii) (A) which states that "defense orders need not be accepted if the steel ordered is not of the kind usually produced or capable of being produced by the person to whom the defense order is offered." Mills who "usually" roll merchant bars will have a leg to stand on, certainly. Whatever technicalities may be raised by Order M-21, it definitely affords no solace to non-defense customers and jobbers. The only thing which can help them is adjustment of the price schedule.

Agitation for a price adjustment

Mill Supply Group Will Meet Aug. 29

Los Angeles

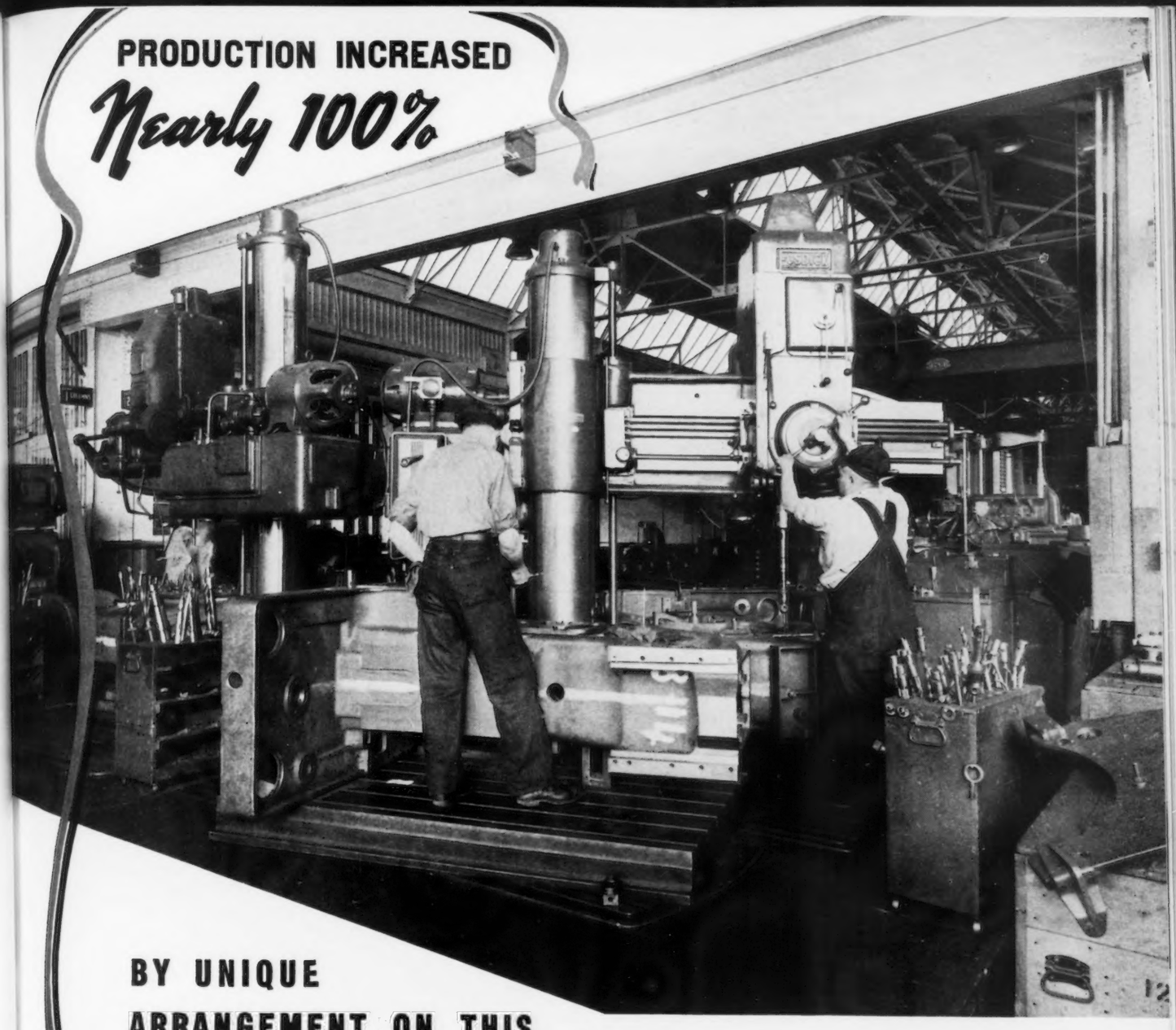
• • • A meeting designed to acquaint the mill supply trade with the effect of priorities and the defense preference rating plan upon mill supply buying will be held here Aug. 29 under the auspices of the Industrial Supplies Defense Committee. A second meeting will be held at San Francisco on Sept. 3.

The meeting, which will be addressed by OPM representatives, is intended to answer the many problems of buying, selling and manufacturing mill supplies under today's conditions. E. C. Ducommun, Ducommun Metal & Supply Co., 219 South Central Avenue, Los Angeles, will be chairman of the meeting here.

These two meetings are part of a nation-wide series of meetings to be held in leading cities throughout the country open to distributers, manufacturers and buyers of industrial supplies. W. C. Stauble, vice-president, Holo-Krome Screw Corp., Hartford, Conn., is chairman of the national committee.

PRODUCTION INCREASED

Nearly 100%



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FOSDICK *Economax* RADIAL

Here's a job that definitely illustrates versatility and economy of Fosdick Radial Dr at Kearney & Trecker.

By means of a special base two milling machine columns are mounted one each si of the Radial Column. While one operator sets up the milling machine column ar locates jigs in operating position the Radial operator drills and taps the required hol on his work. When completed, he swings the head over the other milling machi column, so that holes can be drilled and tapped, removes completed column and se up another one in its place. By this time the latter column is finished and the oper tion of setting up is duplicated. Thus operation is practically continuous and produ tion has been increased almost 100%.

This unique arrangement may not be applicable to your work but if it can be done a Radial there's Fosdick for that job . . . let us show you how Fosdick Radials can sav for you. A Fosdick Radial Drill Bulletin RA is ready for you. Write for your cop

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between merchant and reinforcing bars has not come from the mills who reflect the attitude that "the price has been frozen and we accept it; we're rolling as much reinforcing steel as we can for defense work." Rather, pressure is coming from jobbers and consumers who feel that they might be able to catch a few crumbs if the merchant-reinforcing parity which exists in all other basing points were extended to the Coast.

Aside from bringing the price relationships on the Coast in line with the rest of the country, a case for parity can be made readily from an economic point of view. Freezing of prices as they exist at any particular time can only reflect dynamic supply, static demand, and artificial influences operating at that time. Rather, unless such a situation as now exists is to result, the frozen prices must be tied to cost of production all down the line. This practice of cost-plus awards has been followed in many government contracts. This line of reasoning has many pitfalls, but it can at least be offered as a theoretical justification of rectification of the present situation. Practical justification is provided by the situation itself.

SEARCH for scrap for West Coast mills has extended to Mexico without success. Number one heavy melting steel is said to be available c.i.f. Nogales, Sonora, at approximately $20 per ton, a figure which might warrant consideration. Unfortunately, however, export duties and other charges totaling about $11 per ton must be added, which, on top of freight to mills, makes the cost prohibitive. Pressure from Mexican steel producers to prevent scrap exports might also be felt, it is said. If the California situation becomes much tighter, and domestic stocks are exhausted, Mexican export duties might well receive State Department consideration.

The Western Division of the National Aircraft Standards Committee held its 36th meeting at the Boeing plant, Seattle, Aug. 8 and 9, continuing work on an agenda of proposals to be submitted to its own executive board for national approval. After approval by both Eastern and Western divisions and the executive board, proposed standards are submitted to the permanent working committee of the Army-Navy aeronautical board whose approval makes them Army-Navy standards.

Officially representing most American aircraft manufacturers, the Standards Committee is in a position to furnish the Army-Navy board an industry-wide survey of aircraft subjects. This takes much of the burden from the Army-Navy board, which must prepare standards of materials, processes, and standard parts designs for both services.

Items approved at Seattle are (1) series of close tolerance bolts, (2) universal joints, and (3) control rod terminals. In preparation are uniform machine finishes for the aircraft manufacturer and subcontractor, which is considered one of the most urgently needed standards; material identification codes, principally for steel; military and commercial control wheels with interchangeable control switches; and other subjects.

MEETINGS of the Western Division are held monthly, usully in southern California, but twice a year in Seattle. Attending the Seattle meeting were John Cramer, Boeing, host to the group; Gordon Waite, Consolidated; Frank Salisbury, Douglas (El Segundo), Western chairman; Jim Misner, Hughes; Lou Cummaro, Lockheed; Bob Greenwald, North American; Glen Aron, Northrop; Tom Hearne, Ryan; Jack Cox, Vega; and Charles Sardou, Vultee.

From the conference room window, conferees could see Douglas DB-7's coming off the Boeing assembly line parallel to Boeing B-17's, visually presenting a strong case for standardization of subassembly parts, processes and materials in building large numbers of given models. Especially when facilities of several large plants are pooled, as is being done more and more, standards are a boon to the sub-contractor.

The West Coast Shipbuilding Corp. last week filed incorporation papers at Olympia, Wash. The new firm contemplates construction of a yard near Vancouver, Wash., on the Columbia River, but as yet holds no contracts. Alaskan Copper Works, Seattle, opened a 10,000-sq. ft. addition, which, with new machinery, doubles its facilities.

STING IN THE TAIL: Four guns are mounted in this power-operated turret in one of the heavy bombers taken recently into action by the RAF.

Photo by Harris & Ewing

Fatigue Cracks

BY A. H. DIX

Automotive Argument

• • • All too often does the positive hand of science wrap itself around the throat of a pleasant controversy and coldly choke the life out of it. Conclusive information provides a certain amount of satisfaction, but it is a poor substitute for the blood-coursing excitement of a free-for-all argument.

Which is why we are happy to see this in *On the Assembly Line:*

> Buick will feature as a mechanical improvement an artificial roughening of bearing surfaces . . . its story will be directly competitive with the Chrysler Superfinish story.

Here we have the beginnings of an epic argument, something that may take its place with the classics, predestination vs. free will, the overlapping vs. the interlocking grip, environment vs. heredity, the stirred vs. the shaken cocktail, horse tail-docking vs. anti-docking, and boogie woogie vs. schmalz.

With growing indications that discussions of the relative merits of isolationism and interventionism will soon become merely academic, we look forward with pleasure to this bone of smooth vs. roughened bearings, to be gnawed over in the long winter evenings ahead, with Detroit's best engineering brains offering generous aid to both sides.

Aptronym

• • • C. S. (Hoskins Mfg. Co.) Kinnison informs us that a supply officer at the U. S. Naval Air Station, Pensacola, Fla., is Commander W. S. Hullfish. He was doubly predestined for the Navy, but there are those who fight their stars. Take, for instance, the District of Columbia's assistant purchasing officer, George T. Teachum. Obviously he should be an instructor in an Indian school.

Nails With Tonsils

> Finishing nails, also queried last week, have since supplied OPM with a similar list.
>
> —THE IRON AGE, Aug. 14, page 68

We now wait with bated breath to hear of screws interviewed, rivets third degreed, and tacks interrogated. —*Elton Sterrett*

Nutley's Angry Man

• • • Despite Japanese beetles and priorities, A.D.W., of Nutley, N. J., finds time to work himself into a lather over the misuse of the word *glamor*. *"Packard advertises that it makes a 'glamorous car.' Why not print its definition and shock people?"* he writes. Brace yourself:

> *Glamor:* A delusion wrought by magic spells; charm, enchantment. Or any artificial interest or association by which an object is made to appear delusively magnified or glorified; illusion, fascination, witchery.

Of course, this is just another instance of the dictionary lagging behind usage. Thanks to Hollywood press agents, glamor is now synonymous with beauty, and Packard's copywriter merely echoes the meaning the word has in the public mind. Glamor, by the way, is a Scotch invention. A hare-lipped Scotchman took *grammar*, meaning a book of magic, changed the first *r* to *l*, and that's how *glamor* was born.

The dictionary is a poor arbiter in settling semantic squabbles. As a book of rules, it is always years behind the way the game is actually being played. The Iron Molders' Union's financial officer, for instance, signs himself "Financier," which is perfectly proper according to the dictionary, but a usage withdrawn from the common tongue long before knees ceased to be news.

Hose and Hatchet Passport

• • • There are few plants to which the members of your favorite family journal's brains department have not entrée. One was the experimental plant laboratory of a certain large and well-known company, located in a barred, heavily guarded building apart from the main plant. "You can go everywhere but there," we were told.

One of the editors happens to live in the town in which the plant is located, and furthermore is a member of that town's volunteer fire department. You can guess the rest. Recently there was a midnight fire in the guarded building, and doors that were closed to him as an editor opened to him as a gallant fire laddie. He saw all. While the impressions recorded in the firefighting portion of his cerebrum are, of course, seeping osmotically to the editorial side, we shall be, as always, ethical, no matter how it hurts.

Stoppers

> No Holds Barred!—*Standard Pressed Steel Co.*
> Packard Shaves and Merlin Ticks.
> —*Michigan Tool Co.*

20 M. Per Qt. of Oats

• • • Frank M. Braisted, Jr., sends us an item from H. I. Phillips' famous Sun Dial column in the New York *Evening Sun*. The item refers to the threatened 50 per cent reduction in automobile production, and suggests that it can be accomplished by supplying buyers with half a car. As evidence of the soundness of the idea, the item mentions this photograph on page 78 of the July 24 IRON AGE.

Because there is no gasoline to be had in German occupied Paris today, some Frenchmen have had their automobiles cut in half, placing a horse where the motor used to be.

Mets Mixed by Expert Hand

• • • For ability to blend two metaphors into a perfect whole, as skilfully as a veteran bartender weds gin to vermouth in producing the highly potable Martini, give us Charles Post, our Pacific Coast editor and author of the scintillating "West Coast" section (see page 72). The particular bit of word magic that causes us to reach for a high tension superlative is this:

> Large industrial developments . . . have caused the Bonneville-Grand Coulee white elephant to change its spots almost overnight. . . .

Puzzles

The answer to last week's flagpole problem is 49.2125 ft. plus, although it seems to us there is another answer, as the pole can break just above the blockhouse roof and fulfill the requirements of the problem.

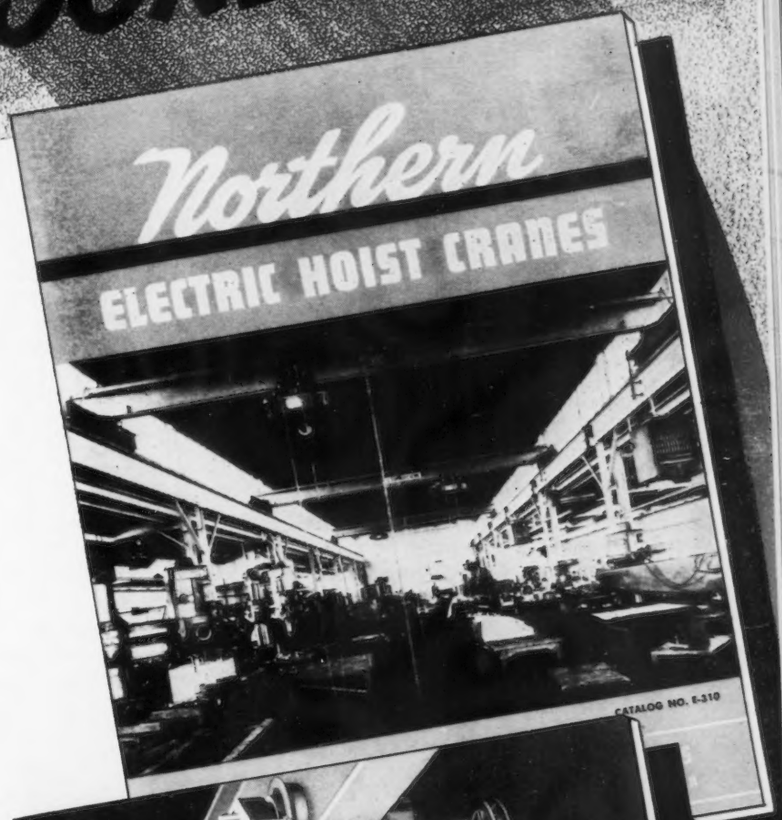
The master minds have been having a field day with the difficult July 31 problem, and answers range all the way from 35 to 2730. Among those who have stuck out their necks are George Benoit, Lt. Com. A. R. Simpson, Mrs. Ruth W. Perry, and A. W. Kelly. The dust is still too thick to see who has the right answer, and we will wait till it settles.

Strum this on your medulla oblongata:

> *A farmer wishes to dig a connecting trench from the upper left corner of a plot 100 ft. long by 50 ft. wide to the lower right corner. The ground immediately along the extreme left border (100 ft. long) is sandy and can be dug at a cost of $1 a foot. The remainder of the plot is rocky, and digging there costs $2 a foot. What arrangement of the trench will cost least?*

Send FOR THESE BOOKLETS

ON ELECTRIC HOIST AND HOIST CRANES



Electric Hoist Cranes are economical in first cost, easy to handle—are built in various capacities up to those large enough to move 15-ton loads.

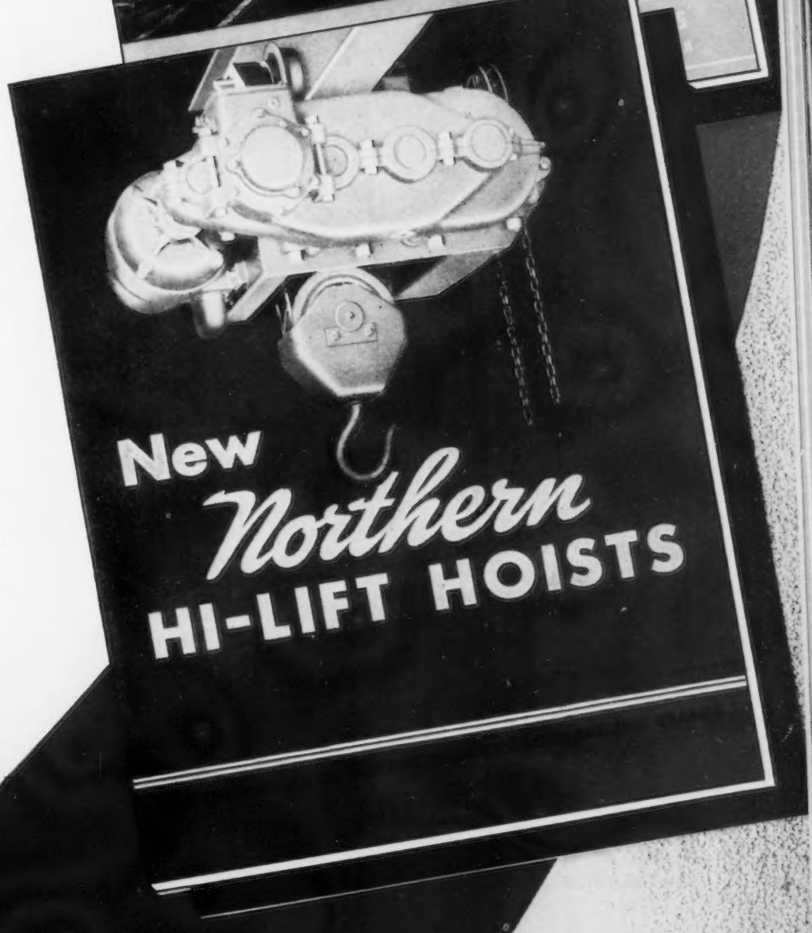
They may serve as auxiliary handling equipment in connection with large overhead traveling cranes in large plants, or may move all of the material in small plants.

The Northern Hi-Lift Hoist

The essential feature of these Cranes is the Northern Hi-Lift Hoist, a modern low headroom hoist built with machine tool precision. Outstanding in design and construction, it gives maximum hook lift, assures continuous operation, provides positive control and safer handling.

The Northern Electric Hoist Crane is built in many different types, including cab or floor control.

We furnish the Crane complete, or furnish the Hoist and end trucks plus necessary accessories and drawings. In this case you can save freight by buying the girder locally.



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This Industrial Week . . .

. . .

UNITED STATES industry this week found its defense building problems multiplying but falling into somewhat less vague forms—thus they could be better appraised. Signs suggested that something was likely to be done about them.

Something was done, for example, about steel capacity, the American Iron and Steel Institute reporting that the nation's ingot capacity rose almost two million tons during the first half of 1941 to a total of 86,148,700 tons.

Farming out of defense orders on a vastly increased scale, so that many more hundreds of plants, including many small factories, may be brought into defense production, has blown up like a great wind in the last few days. Pigeon-holed for many months in the minds of defense agency and industrial leaders as "just one of those things," the need for production is finally everywhere being acknowledged. It seems as if something may be done about sub-contracting.

Accent on Subcontracting

The shortage of iron and steel scrap has emerged as a major problem, following several months of constant warning by industrial people that this was a condition which was already reducing steel production and could have disastrous effects on the defense program. This week (Wednesday) 150 scrap buyers and sellers were to meet at Washington, not with minor defense officials, but with William S. Knudsen, the OPM director, with Leon Henderson, the OPACS director, and with representatives of the Army and Navy.

To industry, particularly to that growing section which has non-defense orders and so faces a lack of raw materials, it grows more clear that unemployment on a large scale is likely to be unavoidable in some areas. This problem of the jobless, existing side by side with the need of finding skilled men for new aircraft and munitions plants and for shipyards, is quickly reaching the stature of a major dilemma.

For another seven days, the steel and metal-working industries have been racing from knothole to knothole in the series of openings through which, from time to time, they have been given official views, none complete, of what the government wants done in the defense program. (Bernard M. Baruch told THE IRON AGE this week that only Hitler can know the measurements to which this country must build its defense machine.)

From Knothole to Knothole

Up to now production of defense materials and equipment has frequently been geared to incomplete information about the magnitude of the need for planes, ships, guns and tanks, but industry is becoming better informed on this point. A few days ago Sumner Welles, Undersecretary of State, promised South America that goods of which the United States is sole or principal supplier will be made available to Latin Americans as liberally as to the people of this country and "upon an equal basis."

While some difficulties of manufacturing defense items in the quantity now demanded, in the time periods hopefully outlined, can eventually be overcome, most industrialists believe that in backing up the "maintenance of membership" principle in the Federal Shipbuilding strike at Kearny, N. J., the government is hardly taking the right step to help a lame dog over a stile. Certainly most industrialists and most employees want to help the defense program. Certainly most of them do not want interruptions in production. By assuming management powers at the Kearny yards (without, however, indicating that it would dismiss employees not in good union standing), the government did not move in the direction of peace and order and greater defense production. Apparently it did throw open the door for similar maintenance of membership union demands on all metal-working companies which have union contracts.

New Union Issue Rises

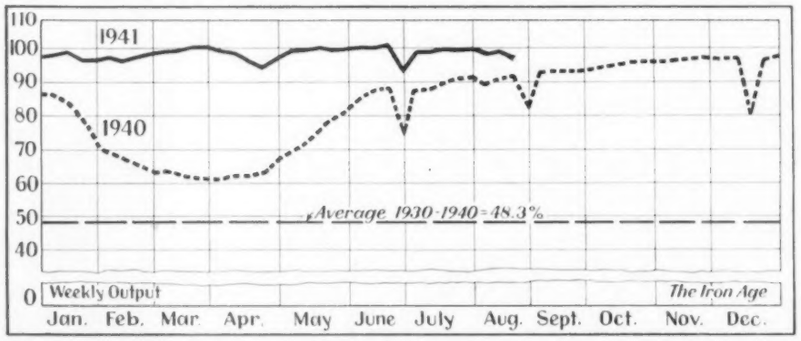
On the credit side of the week's news, industry finds Army and Navy purchasing officials giving up some of their strongly-held positions and leaning to "bits and pieces" output to speed arms making. Briefly, the new sub-contracting program, announced by Mr. Knudsen, is aimed to (a) concentrate farming out of defense contracts in communities and industries faced with unemployment resulting from priorities and (b) require in every prime defense contract of $250,000 or more a detailed statement on the sub-contracting intentions of the prospective contractor.

Army Favors Bits and Pieces

At the same time the OPM's Defense Contract Service is to be removed from the obscurity of a unit in the Production Division and made into an independent bureau in the OPM.

Steel Ingot Production—Per Cent of Capacity

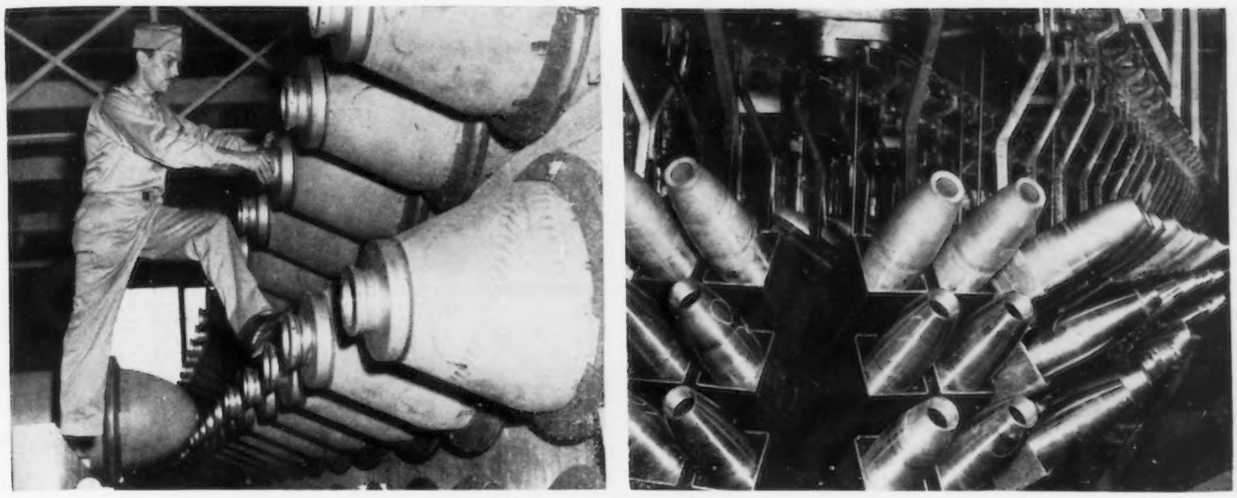
(Open Hearth, Bessemer and Electric Ingots)



Steel Ingot Production, by Districts—Per Cent of Capacity*

	Pitts-burgh	Chi-cago	Val-leys	Phila-delphia	Cleve-land	Buf-falo	Wheel-ing	De-troit	South-ern	S. Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
Current Week.....	100.0	109.9	97.0	92.5	96.0	103.5	90.0	99.0	96.5	101.0	100.0	110.0	95.0	97.0

*Current week's operations computed on basis of new capacity data. Revision of back weeks will be published here next week.



BOMBS AND SHELLS: An Army officer, Captain Earl D. Payne (left), inspects the joints for attaching to tail fins heavy bomb cases. These are ready for loading at the new $46 million Ravenna, Ohio, ordnance plant. The empty cases weigh 945 lb. each, the loaded bomb 2000 lb. Passing on a monorail conveyor (above) are some of the 105 mm. shells being produced at the forge plant of the G-M Oldsmobile division at Lansing, Mich. To date, General Motors has delivered more than $7 million of shells, guns and fuses.

Fullest Scrap Control Likely

Much dissatisfaction over priorities and losses sustained by small plants through mandatory diversion of such materials as steel to defense work arises in Midwest areas. A recent survey of small Illinois plants (95 per cent in the metal working field) showed that 64 per cent expect to be out of business before the end of the year unless a way is found to supply them with materials. During the next 30 days significant changes are likely in the general industrial picture with many hundreds of small plants in Ohio, Pennsylvania and other industrial states restricting their operations or closing down entirely.

Possibilities that iron and steel scrap will come under a full priorities system, or that a government pool to handle emergency needs will be created, were being discussed at midweek, prior to the Knudsen-Henderson conference with scrap buyers and sellers. Steel plants apparently face higher scrap prices, since community scrap collection drives are unlikely to bring out the continued, heavy tonnages needed and other methods tried to bring out sufficient scrap have not been successful. The southern states, normally not an important contributer to the scrap supply, were able to develop large tonnages during the export movement of a few years ago when prices were high enough to encourage scrap collection. Meanwhile the OPACS scrap price structure is in a state of complete collapse.

Meanwhile steel manufacturers regret the spread of the misconception that most steel going into defense will be for tanks, ships, guns, planes. Actually the biggest tonnages of defense steel will be utilized in pipe lines, freight cars, factory buildings and other such items. Other common errors are in believing that steel is being hoarded and in confusing the industry's ingot capacity figures of more than 84 million tons with the 55 million tons of finished and semi-finished steel likely to be shipped in 1941.

Incoming business dropped this week for some steel plants, as consumers gathered information for Form PD-73, as required by the OPM, before submitting orders to steel companies. Steel users were reminded again that civilian steel in process is not exempt from priority control. Other companies reported an inflow of new business still well above plant capacity. Demand for plates, shapes and bars is tremendous, and heavy new defense orders are expected to be placed in a few days. More and more the steel consuming and producing industries are yielding to government control of tonnage accepted, rolling schedules and deliveries.

Partly because of lack of scrap, steel plants were unable to push ingot production above last week's rate, this week's rate being 97 per cent, based on the American Iron and Steel Institute's new capacity figures as of June 30. On the old basis this week's rate would be 99.5 per cent.

Four New Blast Furnaces

The new capacity figures show total open-hearth capacity of 76,097,130 tons, electric furnace capacity of 3,272,370 tons and Bessemer capacity of 6,793,400 tons.

Construction with Federal funds of four blast furnaces with a total annual capacity of 1,572,000 tons, to be operated by Republic Steel Corp., is another step in the OPM plan to lift blast furnace capacity by 6,500,000 tons annually. A sidelight on the metal shortages appears in reports from various IRON AGE correspondents that many foundries, beset by a lack of scrap and hampered by priorities shutting off iron supplies from non-defense plants, are in a precarious position.

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★ The word "substitute" in a great many minds means something inferior. That's far from the case with DBL High Speed Steel. This low-tungsten molybdenum steel is a patented product, developed and perfected several years ago by our Research Staff for the express purpose of *fully* replacing high-tungsten "18-4-1" for strategic reasons. Today DBL is doing just that, conserving a critical metal without forfeiting its essential qualities, working as a great "V . . . -" alloy!

DBL fully replaces 18-4-1 in performance. It cuts as well or better in 85-90% of all cases—you won't lose a single minute's production. It heat-treats in the same equipment and by the same methods as 18-4-1, too—you'll have nothing new to learn, and nothing new to buy. And, as a bonus value, DBL costs less than 18-4-1 and is somewhat lighter—you get more pounds per dollar, and more tools per pound.

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Farm, Auto Scrap Supplies Shrinking; Wrecking Pace Slow

Detroit

• • • **Three of the most** important and fertile sources of scrap in this fairly typical mid-western area are showing signs of being less productive in the near future. These three are the manufacturing plants, especially automotive, but including all on civilian work, the auto wrecker industry and the farms.

Reasons for decrease in supplies of scrap from these sources are a steady and growing demand for the materials for other uses, a slowing of the traditionally slow course which some products travel en route to the scrap heap, actual near-exhaustion of sources for several varieties of scrap, basic changes in industrial practices that decrease the amount of available scrap, influx of new materials that replace ferrous materials, and lastly price restrictions.

The latter (price restrictions) are most felt where there is a competitive demand for the material, but are also seriously felt where labor is too busy with other tasks, or higher paying tasks, to be engaged on scrapping operations.

Iron and steel scrap from automobile plants and parts manufac-

SCRAPPING JALLOPIES: OPACS and industry is endeavoring, and with only moderate success thus far, to speed the scrapping of old cars. These views show the rate of "activity" in typical graveyards just outside Detroit. Income for such yards is from resale of car parts rather than scrapping, hence yard operators are not overly enthusiastic over plan to speed their turnover.

turers is at a relatively low point now because the industry has just gone through its model change-over period. Automotive scrap, which includes large quantities of No. 1 bundles, flashings, borings and turnings, loose sheet clippings and discarded dies, will be available in successively smaller quantities as automotive curtailment becomes a reality. Roughly speaking, the availability of these materials will decrease in proportion to the curtailment. Change-over of many plants to defense work will cause an interruption in supplying of scrap and in some cases will sharply reduce the amount of scrap available.

As an example of changes in industrial practices which will reduce the amount of available scrap, it is possible to cite the manufacture of tanks and of machined shell forgings, both of which will occupy a large part of the manufacturing efforts of this area shortly. Most of the tank plate is being cast to shape and requires little machining. Similarly, the forged shells require relatively less machining than automotive axles and hubs, for instance.

Concentration of a major part of automotive productive effort in airframe manufacturing will result in substantially less production of ferrous scrap because most of the material employed in the airframe is aluminum, or its alloys.

The auto wrecker industry has a surplus of "raw materials." Old automobiles are plentiful and can be found in large numbers in the vicinity of almost every city and town. These holdings are so scattered that it is impossible to arrive at any estimate of the numbers available.

The automobile wrecker buys automobiles for the parts he can take off and sell. Fundamentally he is not interested in scrapping operations. To him, scrap is merely a by-product. The prices paid for used automobile parts are high enough to provide a distinct barrier that prevents the scrap yard from purchasing these vehicles. With the maximum prices now in effect on scrap iron and steel, the peak price that can be paid for a "junker" by scrap yard operators is somewhere in the vicinity of $15.00—and this assumes that he is able to salvage batteries, tires or some other part before he scraps the vehicle. Operators in Michigan say they can pay approximately $12 to $15 and get by with a profit under these circumstances. However, dealers in used auto parts are paying upwards of $25 for the same type of vehicle.

So far, no one has discovered a way to accelerate the junking of such automoibles once they get in the hands of the auto wreckers. It is not the practice in this industry to take in such cars and completely disassemble them. They are stored in open fields, or in closed yards, and parts taken off only when the yard operator finds a sale for the parts.

The low prices being offered for automobiles by the scrap yards prevents the rapid movement of these cars out of the auto wreckers' hands. Also, there is considerably lethargy displayed in this business and most auto wreckers simply accumulate acres of autmobiles without attempting to dispose of them finally. Then, when the prices are high, they will clean out their yards and sell all the old cars at once to a scrap yard. A check-up on some of these auto wreckers yards shows accumulations of as many as 3500 old vehicles in one spot.

Another factor is the tendency of the auto wrecker to hang onto models up to 15 years of age. On this point, it is generally agreed—by auto wreckers, scrap yard operators and the automobile industry—that if some kind of age restrictions were in force that would definitely take such ancient vehicles off the road, there would no longer be any incentive for the hoarding of cars that old for possible repair parts. It is pointed out, for instance that if age restrictions or severe tests were to remove all the nine, ten and eleven-year-old cars (and older) from the roads, the auto wrecking yards would no longer have excuse for holding cars of these vintages in stock.

From these facts it is concluded that junked automobiles could be moved to steel furnaces more rapidly if (1) the demand for old automobile parts could be altered and brought under control, (2) the auto wreckers were persuaded to take inventory of their stock and sell the surplus to scrap yards and (3) a price parity could be established between the auto wrecking yards and the auto scrapping yards. A few years ago Ford Motor Co. partially accomplished the latter objective by paying what amounted to a subsidy to automobile dealers. Perhaps again there is need for a subsidation, but the auto industry—now suffering the pains of curtailment—would not be interested in such a move. If it comes, it must come through some government agency or the steel mills.

While farm scrap is still available in this area, there are definite indications that the quantities will not be overly large. One reason for this is that farm machinery probably will be used a little bit longer than normally because the agricultural implement industry will feel the effects of material shortages and priorities in greater or less degree.

The shortage of labor, and concomitant higher wage demand have a bearing on this discussion. As pointed out, the farmer can't get much help and must pay high wages for the workers he does hire, so he concentrates on the most profitable aspects of his operation and forgets about selling iron and steel scrap for the time being. The auto wrecker who once could get plenty of help at $1.50 to $2.00 a day now finds it hard to get even inexperienced help at twice this figure. Similarly, the scrap yard operator is faced with the problem of obtaining labor and of paying higher prices when he does.

Scrap Standards Used By OPACS Available

• • • Copies of Classification of Iron and Steel Scrap, Simplified Practice Recommendation R58-36, which contain specifications governing the grading of material listed in the scrap price schedule promulgated by OPACS, are again available, the National Bureau of Standards reports. Copies of these standards may be obtained by writing the Superintendent of Documents, Government Printing Office, Washington. Cost is 5c. a copy.

Detailed specifications indicating what type material each grade of scrap covers are given and as well as a recommended contract form for the purchase of scrap.

Nationwide Scrap Drive by OPM Likely

Washington

• • • **To replace ineffective** local drives, OPM is expected soon to announce a nationwide iron and steel scrap salvage campaign. It is admitted that the local collections have contributed relatively unimportant tonnages considering the shortage that exists and consumption requirements.

While details of the OPM plan are yet to be disclosed, it is understood that it will discourage the false notion of collecting old material that is not suitable and would be extremely costly to prepare for furnace charges.

In this category are such items as automobile license tags and tin cans. Then there are some collections such as old razor blades which are of no value both because of the small tonnage involved and the varying kinds of alloy material used in their manufacture by different manufacturers. Suggestions already made by OPM are recognized as being sound but so far the experiment has been local and to be effective it is urged it must be expanded on a nation-wide scale.

The heavy and desirable tonnage, in the opinion of the scrap trade, must come from such sources as farms, old buildings, abandoned street car and railroad tracks, and junked automobiles. The importance of recovering old material from abandoned street car and railroad tracks long has been recognized as indicated by a recent report of OEM Transportation Commissioner Ralph Budd.

Budd has estimated that 232,000 tons of scrap can be recovered from city streets and has solicited the aid of the WPA in removing abandoned street car and railroad rails. He also has asked railroads to make a check on all possible scrap supplies that they can produce.

The OPM recently extended its scrap collection campaign, initiated in Ohio, to New England. If extended nationally and perhaps supplemented in certain important aspects such as wrecking of old buildings, the belief prevails that it, together with the OEM plan, would contribute materially toward relieving the scrap shortage.

An outline of the OPM campaign is: (1) Scrapping cars now parked in automobile graveyards and urging wreckers to strip cars of parts and engine blocks without delay; (2) Encouraging farmers to market derelict cars, worn-out machinery and other scrap laying idle in farmyards; and (3) Selling small plant owners on the idea of gathering and marketing scrap.

7 Months Scrap Use Exceeds All of 1917

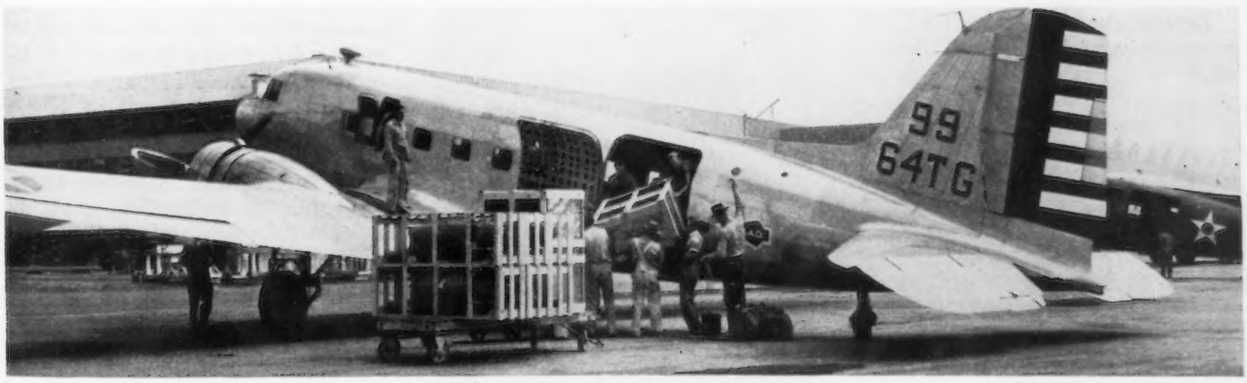
New York

• • • **More iron and steel** scrap was consumed by steel mills and foundries in the first seven months of 1941 than in any entire year of the first World War, according to Edwin C. Barringer, executive secretary of the Institute of Scrap Iron and Steel, in releasing the institute's estimate of consumption for July.

The July domestic melt of 4,415,000 gross tons brought the seven-month total up to 30,948,000 tons. In all 1917, which was the greatest scrap consuming year of the first World War, the melt was only 26,800,000 tons.

July consumption was approximately 25 per cent greater than the 3,526,000 tons of last July. The seven-month total of 30,948,000 tons for 1941 is an increase of 45 per cent over the 21,738,000 tons consumed in the comparable period of 1940.

FLYING FREIGHTERS: Many new industries are growing out of the defense program. One likely to last is large scale transportation of materials and finished products by air. Shuttling on schedule between army bases throughout the country are fleets of army planes (like the Douglas, above) carrying military equipment on their own air lines.



OPM Acts to Rush Defense Orders to Smaller U. S. Plants

Washington

• • • **Army and Navy** purchasing chiefs were prepared this week to face substantially higher costs for government defense work by reducing legal hurdles and negotiating contracts at prices up to 15 per cent above current quotations if necessary to stimulate more sub-contracting of defense work.

Faced with the unemployment backfire of the priorities system and the failure of sub-contracting machinery to prevent a concentration of defense orders, the OPM-Army-Navy high command took what was officially described as "drastic action" to encourage more "farming out" by prime contractors, promising that the government would foot the bill.

After conferring with Lord Beaverbrook, Britain's minister of supply, on the need for steel, tools and tool steel under the lend-lease program, OPM Director General William S. Knudsen told a press conference that, although the new program requires statements in every contract on the extent of "farming out" contemplated, OPM lacks power to enforce the program except through influencing contractors while acting as "sales engineers" for the Army and Navy.

The plan of action, which had been previously approved by the purchasing officials of the Army and Navy and OPM representatives, was formally adopted on Aug. 19 by the OPM Council, composed of Director General Knudsen, Associate Director General Sidney Hillman, Secretary of War Henry L. Stimson and Navy Secretary Frank Knox.

Briefly, the sub-contracting program designed to head off "depressions in the midst of prosperity," will:

1. Give special treatment to communities or industries faced with unemployment by spreading defense work among more sub-contractors.

2. Require in every contract for $50,000 or more, a statement on the percentage of work to be "farmed out" under sub-contract.

3. Require in every contract proposals of $250,000 or more a detailed statement on the sub-contracting intentions of the prospective contractor.

4. Decentralize the activities of the OPM's defense contract service, remove the unit from the relative obscurity of a unit in the production division, and make it an independent bureau in the OPM.

Robert L. Mehornay will continue to head the contract service. William E. Levis, OPM production planning board member who will assist Mr. Mehornay, gets a full time job as personal representative of Messrs. Knudsen and Hillman.

The "special treatment" promised needy communities and industries will materialize if the contract service investigates production possibilities and the OPM recommends a remedial program to the War and Navy Departments. The Secretaries of War and Navy then could follow one or more of these steps:

1. Negotiate contracts at price up to 15 per cent above current quotations in lieu of placing orders on a competitive bidding basis.

2. Place orders with "a responsible defense association or corporation" which was organized so that manufacturers could jointly handle defense work that they could not undertake with their individual equipment.

3. Eliminate when necessary the requirement for a bid or performance bonds.

4. Inspect products at plants to facilitate prompt payment.

5. Reimburse prime contractors for additional costs resulting from the extension of such policies to their sub-contractors.

The defense contract service already has field offices in 36 Federal Reserve Banks and branch banks. Additional branch offices are currently being set up in other cities by various state governments. Manufacturers seeking sub-contracts should by virtue of the new program, be able to ascertain more definitely the needs of the government and prime contractors. For example, branches of the defense contract service hereafter will be circularized with bid forms, blueprints and specifications.

In order to permit smaller concerns to bid for appropriate quantities, invitations to bid for large quantities will be broken down into optional units, and contracting officers will be empowered to divide an award so that part of it will go to other than the low bidder.

Because prospective government sub-contractors prefer to see samples, more exhibits will be set up to show specific items broken down into component parts and labeled with a description of machine tools and equipment and the operations necessary for production.

The program also contemplates restricting awards to regional bidders, unless otherwise approved by the department head, where regional bidding is requested and production facilities permit. If earlier delivery is desirable and an earlier delivery date is proposed, this fact will be weighted favorably in valuing bids.

An order or priority request for a machine tool will not be approved if it is found that a used machine tool is available to do the job.

The statement showing the minimum percentage of sub-contracting to be followed, required in every contract in excess of $50,000, will become part of the final contract, and the percentage of sub-contracting guaranteed by a bidder will be weighted favorably in valuing bids.

The detailed statement required in all contract proposals of $250,000 or more will be covered in further explanations to be issued by OPM, but officials said the statement will be designed to give the government full information on whether a prospective contractor intends to buy additional machinery to handle the contract, whether he has engaged sub-contractors, and whether he needs help in finding additional sub-contractors.

ARMY CAR TEST: This head-on view of a Dodge 4 x 4 truck on top of a 60 per cent grade was taken at the Chrysler Corp. Service school. Army officers are attending the school which is under the direction of John H. Mack, Chrysler general service manager.

Shortages Cause Ohio Layoffs and Shutdowns

Cleveland

• • • **Increasingly serious** is the plight of non-defense and semi-defense plants throughout Ohio due to raw material shortages and the expected decline in demand from automobile manufacturers. Lay-offs of working forces are becoming more numerous all over the state and are expected to increase during September when the full force of the recently imposed mandatory priority system on steel becomes more effective.

Up to the present, inability to get materials has been most apparent in plants using such scarce strategic materials as aluminum, nickel, zinc and copper. Steel users generally have been able to maintain satisfactory working schedules. Now many companies making steel household equipment, toys and novelties and articles of ornamental iron are genuinely disturbed over the outlook.

Such companies as National Aluminum Products Co., Columbus, Art Stainless Steel Products Co., Navarre and Monarch Aluminum of Cleveland, as well as a number of plants in the Youngstown area which were making metal trim of aluminum or stainless steel have curtailed their working forces now and then.

How to keep intact the working forces of jobbing plants and foundries, which perhaps at times may be operating on less than 50 per cent direct defense business and at other times up to 100 per cent, is becoming more and more a problem, following the announcement of mandatory priorities on steel and pig iron. Unless given raw material in the interims between busy periods for the defense program, working forces of these jobbing plants and foundries are likely to become disrupted. One company using lead at Uhrichsville, Ohio, laid off its factory force for a while until a supply of secondary lead from storage batteries became available. Die casting shops in many sections of the state have occasionally been forced to lay off parts of their forces. Near Lima a company making machinery for grain elevators was hard hit by the Federal government's priority system recently.

The Packard Electric Division

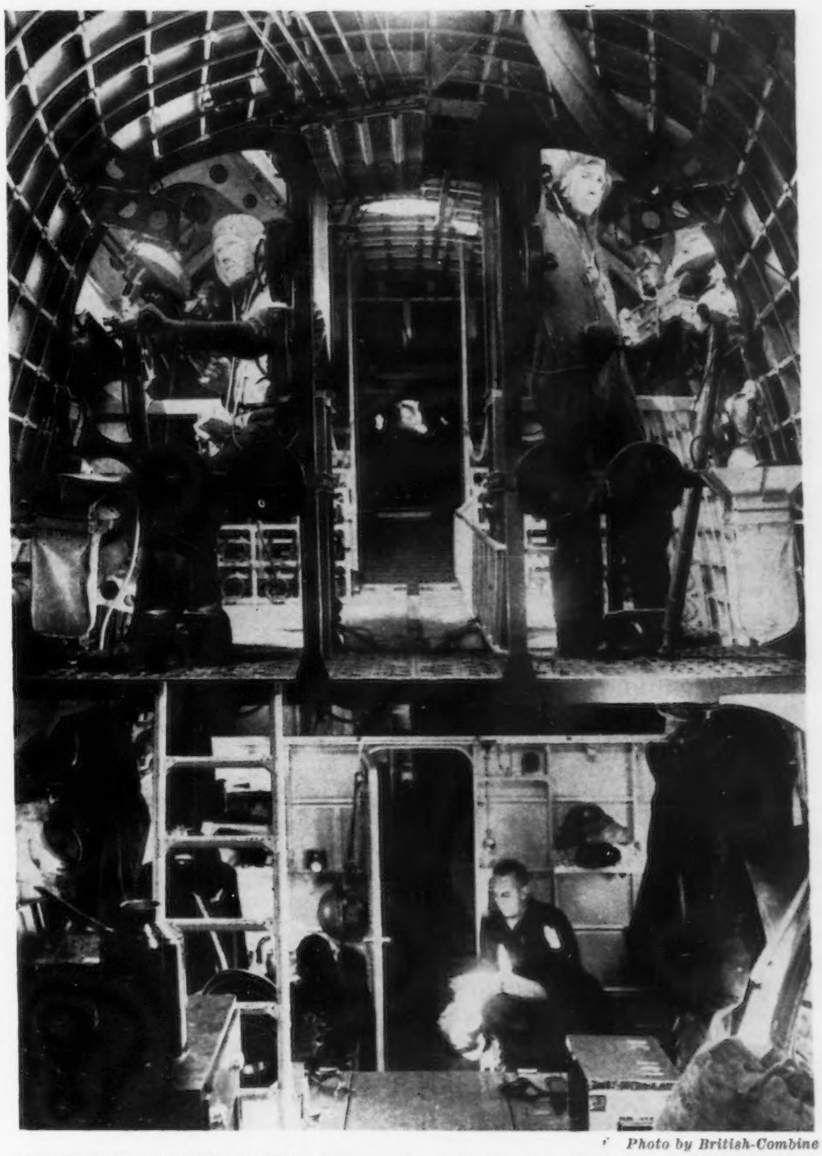
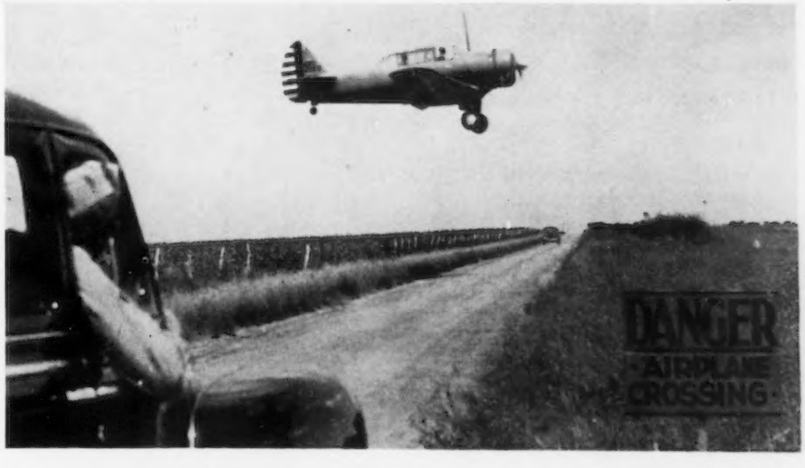


Photo by British-Combine

UPSTAIRS, DOWNSTAIRS: Shown above is the interior of a British Sunderland flying boat.



AIRPLANE CROSSING: Signs warn of low-flying planes at this auxiliary flying field near Randolph Field, Tex.

Photo by Harris & Ewing

DEFENSE TOURISTS: William S. Knudsen (right), OPM chief, and Edward R. Stettinius, Jr., director of priorities (center), are shown making a surprise visit to inspect Engineer Corps equipment at Fort Belvoir, Va.

of General Motor Corp. at Warren laid off about 150 girls for several days last week because of shortage of copper. Although some copper was on hand at the plant, it was said the lay-offs were necessary to balance output. Allied Metals of Niles had a 15 per cent lay-off of its employees because of difficulty in obtaining steel. Even in some of the large plants making welding equipment near Warren and Youngstown men have been laid off from time to time due to the lack of raw material or the delay in obtaining electrical equipment.

Riddlesburg Blast Furnace To Be Blown In October 1

• • • **The Riddlesburg blast furnace,** recently acquired by U. S. Pipe & Foundry Co., and to be operated by Riddlesburg Coal & Iron Co., a subsidiary organization, is expected to be in blast by Oct. 1, operating on Lake Superior ores, according to T. W. Kennedy, president of the subsidiary firm. The property, consisting of about 400 acres of land (largely underlaid by coal), 216 beehive coke ovens and the blast furnace, was purchased from the Colonial Iron Co., which last operated the furnace in 1929.

June Machinery Exports Drop 22%

Washington

• • • **June exports of** industrial machinery dropped to the lowest value since the closing months of 1939, declining 22 per cent below the May figure of $36,508,559, according to information compiled by the Commerce Department.

Exports of machine tools decreased for the second month, dropping to $11,233,804 in June from $14,389,047 in May. April machine tool exports totaled $19,021,589. Virtually all classes of machine tools shared in the decline with lathe shipments dropping to $2,264,671 in June compared with $2,414,299 in May; milling machines to $2,107,007 from $2,950,349; drilling machines to $344,091 from $676,436; and grinding machines to $1,435,216 from $2,061,239.

June exports of other metal-working machinery also declined, the biggest drop being in sheet and plate metal-working machinery. Exports of rolling mill equipment, valued at $227,136 in May, increased to $441,544 in June.

Pennsylvania Beehive Coke Production Booms

Uniontown, Pa.

• • • **Although this county seat** in the heart of the soft coal and beehive coke regions has no direct defense business or many large industrial concerns, the indirect effect of the defense acceleration has pushed payrolls 40 per cent ahead of a year ago and retail sales ahead about 25 per cent from a year ago. In the surrounding regions, close to 8000 beehive coke ovens are in blast, some of them, after having been renovated and rebuilt, operating for the first time since 1918. At that time, out of a total of 38,000 beehive coke ovens, approximately 33,200 were in blast. Since that time, however, steel mills and blast furnaces have built large by-product plants and also many of the old mines which furnished coal for the beehive coke ovens have been worked out. This has resulted in the hauling of coking coal to the ovens by truck, a unique situation.

Civic officials here look for no summer let-down in coal mining owing to the heavy demand for national defense purposes. The principal industrial plant, Richmond Radiator Co., which employs approximately 1000 workers, is working at capacity. At one plant, sanitary ware is produced while at the other boilers, radiators, air-conditioning systems, and anchors are being made.

In the whole of Western Pennsylvania, latest figures indicate that more than 9000 beehive coke ovens are operating out of an available 10,100. In the 1937 business bulge the high peak in coke oven operations reached approximately 5700.

New Steel Capacity Awaits River Straightening

Cleveland

• • • **Expansion of iron** and steel production facilities by both Republic Steel Corp. and Otis Steel Co., here, will be undertaken if the government proceeds with the dredging and straightening of the Cuyahoga River, officers of the two steel companies asserted at a hearing before government engineers last week.

Steel Certification Expected in Canada

Toronto

• • • **Under regulations drawn** up by the new Advisory Committee to the Steel Controller, headed by T. M. Hutchison, president of Drummond, McCall & Co., Montreal, and including officials of the leading steel producers in Canada, the government will act at once to set up a rigid system of documentation and certification for every domestic or imported pound of steel needed and used in the Dominion. To implement the new policy, the steel control staff and organization will be substantially extended. The threat of a serious steel shortage loomed a few weeks ago, and Canada's big shipbuilding program, and other vital war industries are faced with dire shortage of steel. The supply of steel from Canadian sources falls far short of meeting demands, and recently there has been more difficulty in obtaining steel from the United States. Orders have been placed for 110 merchant ships of 9300 tons, for which a total of 350,000 tons of steel are required. Other war industries, as well as the railroad equipment makers, are urgently in need of steel.

How civilian users of steel will fare under the new system, remains for Mr. Hutchison and his committee to determine. It is believed the priority schedule will follow closely the tentative plan announced last year by H. D. Scully, steel controller, who has since been replaced by F. B. Kilbourn. The new steel priorities are expected to be much more detailed and much more complex than the present mandatory pig iron priorities.

It also is understood that consideration may be given to the price of steel. For about 15 months, the steel controller has succeeded in holding down prices, which have been pegged, through the cooperation of steel mills, for about 15 months. Recently, there has been some pressure for an increase to meet higher costs and bring Canadian prices into line with those prevailing in the United States.

Four New Aluminum Plants to be Built; Alcoa Cuts Prices

• • • **Moving to meet** the heavy demands of the enlarged airplane building program, defense officials last week announced plans to increase United States capacity to produce alumina by 600,000,000 lb. annually and to build three new aluminum smelting plants.

Coinciding with approval of the new expansion by the War Department, OPM and the Federal Loan Agency, the Aluminum Co. of America, which will build and operate the new facilities, announced a reduction in aluminum ingot prices of 2c. a lb., bringing prices down to 15c., the lowest on record. The reduction will apply on ingot shipments after Sept. 30. The company also indicated that a comparable cut would be made in fabricated aluminum prices.

The price reduction, coming at a time when defense agencies are battling price rises in other commodities, is the fourth in 1½ years, previous reductions of 1c. a lb. having been made on March 25, Aug. 1 and Nov. 1, 1940. The present price compares with a maximum of 67c. in the open market during the first World War and $8 a lb. 50 years ago when Alcoa was formed.

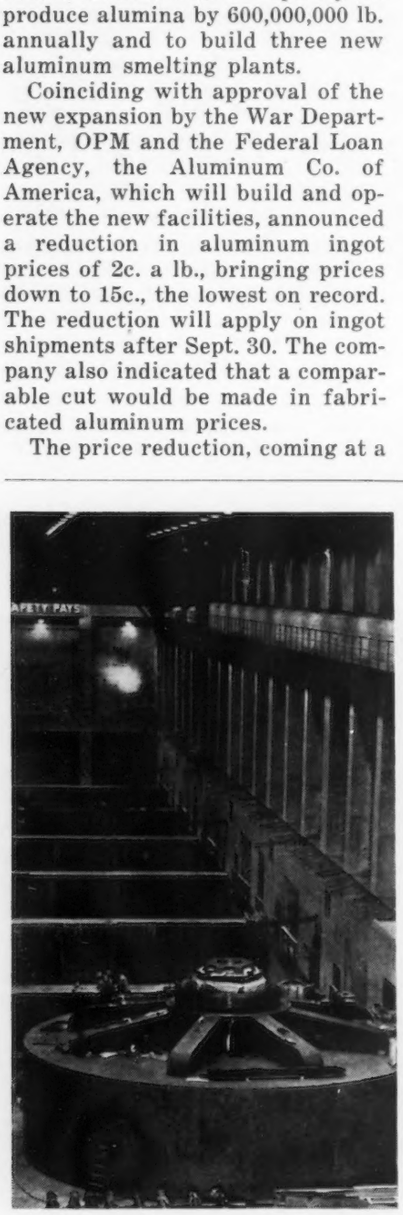
The price cut was made, according to the company, "in anticipation of economies from building new plants . . . and also because of the company's $200,000,000 expansion program begun in 1938 and now nearly completed.

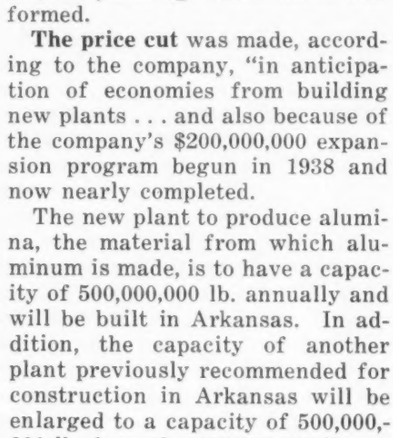
The new plant to produce alumina, the material from which aluminum is made, is to have a capacity of 500,000,000 lb. annually and will be built in Arkansas. In addition, the capacity of another plant previously recommended for construction in Arkansas will be enlarged to a capacity of 500,000,000 lb. from the 400,000,000-lb. capacity previously scheduled.

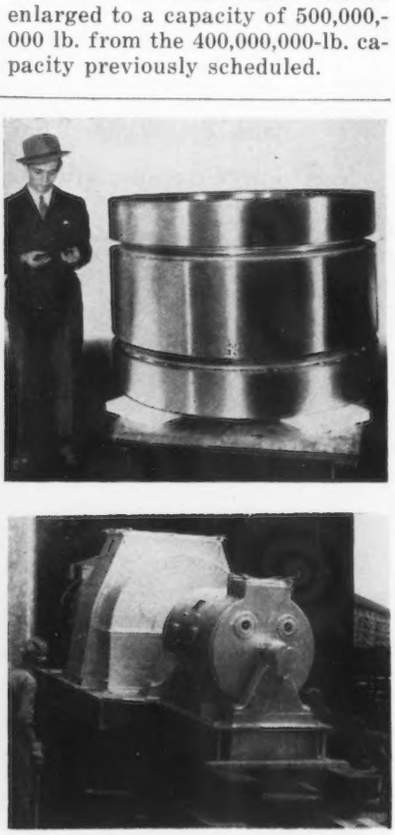
The expansion is expected to give the United States sufficient capacity to produce 2,720,000,000 lb. of alumina which, according to the official announcement, is still short 300,000,000 to 400,000,000 lb. of the amount considered necessary to produce 1,400,000,000 lb. of aluminum ingots and meet the needs of the abrasives and chemical industries.

The OPM also recommended that extraction of alumina from alunite be started on a small scale at Marysvale, Utah, by the Kalunite, Inc., of Salt Lake City, Utah. This plant would have a capacity for treating 100 tons of ore a day.

The three new aluminum smelting plants to be built and operated by Aluminum Co. of America with funds advanced by the Defense Plant Corp., subsidiary of the Federal Loan Agency, will have a combined capacity of 340,000,000 lb. a year. One plant is scheduled for Massena, N. Y., and will have a capacity of 150,000,000 lb.; a second will be built in Arkansas with a 100,000,000-lb. capacity, while the third will be erected in the Bonneville Dam area and will be capable of producing 90,000,000 lb. annually.







POWER FOR ALUMINUM: A 20-ton-motor-alternator set (lower right photo) just completed by Reliance Electric & Engineering Co., Cleveland, is on its way to Alcoa, Tenn., where it will supply current for "floating motor" drives on the hot mill run out tables at Aluminum Co. of America's new aluminum plant. The largest tapered roller bearing ever built by Timken Roller Bearing Co. (top right) is for the same mill's back-up rolls. Two generators like the 108,000 kw. Westinghouse unit (left) at Grand Coulee Dam are to increase the defense program power supply, one in December, the other next Spring. Power from the generator shown is scheduled to flow to an aluminum plant on the lower Columbia River early September.

Reynolds Unit to Make Gun Powder Containers

• • • **Research Corp., an** affiliate of Reynolds Metals Co., has added 125,000 sq. ft. of manufacturing space to its plants in Louisville, Ky., through the leasing of the block-square American Oak Leather plant in that city. About $250,000 will be spent in modernization of the building and the installation of machinery for the manufacture of metal-capped paper containers for use in shipping gun powder. According to V. M. Moody of Reynolds, the plant will be in operation about Nov. 1.

During the previous World War the Reynolds company's sole activity was the manufacturing of similar containers. At that time, production rose to over 50 carloads of these containers daily.

Chicago

• • • **About 285 tons** of aluminum gathered in the national campaign

four weeks ago still stand uncollected in 10 cities in Illinois. There is considerable confusion existing as to just when and by whom the pots and pans will be sent to their final destination—the aluminum smelters.

In Peoria, the pile of 50,000 lb. has been nicknamed Mt. Aluminum. Springfield has given up in disgust and moved its 35,000 lb. from the courthouse yard to a backyard vacant lot. Rock Island has moved its 20,000 lb. out of sight into a river and rail terminal. And Aurora has stuck 32,000 lb. in an idle brewery. Other collection points and the amount of scrap on hand which has not been moved are: Chicago 277,000, Champaign 33,000, Rockford 26,000, Quincy 35,000, Harrisburg 22,000, and East St. Louis 35,000 lbs.

Ickes Reverses His Policy On Identical Bids

Washington

• • • **Secretary of the** Interior Ickes has reversed a long-established policy of making awards in cases of identical bids to plants located farthest from the sites of delivery. This was Mr. Ickes' way of taking a crack at the basing point system, over which he often waxes wroth. The idea in mind was that this policy yielded the lowest returns to the producer while it afforded the greatest possible traffic to the railroads.

Now Mr. Ickes has ordered that contracts for which identical bids are received be awarded to plants nearest the points of consumption. This switch in policy was attributed to the desire of reducing transportation requirements.

Speaking the mind of Mr. Ickes, his Bureau of Reclamation explained that the new policy "will serve equally to help make the practice of identical bidding unsavory to the manufacturers who indulge in the practice."

Seneca Wire Strike Settled

Fostoria, Ohio

• • • **The strike which began** May 25 at Seneca Wire Co. plant here was settled late last week. Production was expected to resume as quickly as equipment could be put in shape.

Photo by Wide World

COVENANTER TANK: The "armored greyhounds" are being mass produced at this tank arsenal in the English Midlands. Britons describe the Covenanter tanks as "having an astonishing burst of speed with terrific firing ability."

SWOC Wins Vote in Two More Bethlehem Plants

Pittsburgh

• • • **The Steel Workers'** Organizing Committee last week won elections at the Bethlehem, Pa., and the Pottstown, Pa., plants of Bethlehem Steel Co. At Bethlehem the SWOC received 11,535 votes, 66 per cent of the total; the independent union polled 5095 votes, 29 per cent of the total, while 839 employees, 5 per cent, voted for neither.

At Pottstown the vote was 777, 62 per cent of the total, for the SWOC; 214, 17 per cent, for the AFL union and 264, 21 per cent, for neither.

Out of approximately 42,000 votes cast in eight Bethlehem plants, the SWOC has polled about 30,000. Additional elections will probably soon be held at the following Bethlehem plants: Sparrows Point, Md., Coatesville, Pa., Steelton, Pa., Lebanon, Pa., Williamsport, Pa., and South San Francisco. According to an agreement between Bethlehem and the SWOC, the union gains exclusive bargaining rights and a contract at all plants where it wins elections.

Metals Allocated For Replacement Radio Tubes

Washington

• • • **OPACS has allocated** metals required for the manufacture of replacement tubes and condensers to keep in operation the bulk of the 50,000,000 radio sets in the United States. The allocation program will be administered by OPM and will expire on Nov. 30. The highest civilian rating shall be given to specific amounts of nickel, steel, aluminum, copper, chromium, tin, brass and other metals required to manufacture radio tubes and electrolytic condensers for replacement purposes. Supplies of tubes and condensers that can be produced from the metals allocated are estimated to be sufficient to take care of normal demand during October, November and December.

Apportionment among the various manufacturers of the metals allocated is keyed in the program to the ratio of each maker's dollar sales of tubes and condensers in 1940 to the aggregate industry dollar sales of the same respective items in that year. Tubes made with metals provided under the program must be marked for replacement use only.

Small Illinois Plants Hard Hit by Priorities

Chicago

• • • **Representatives of small** business of America will ask Congress to: (1) see that a single head of the OPM is appointed; (2) require definite statements of actual raw material needs for defense and of how much material will be available for civilian manufacture.

This has been revealed to THE IRON AGE by Frederick A. Virkus, president of the Illinois division of the National Small Business Men's Association, who has been informed that he will be the first witness called "any day now" by the two congressional committees recently formed to investigate the plight of little business in this country. One committee has been formed by minority leader, Joseph Martin (Republican of Massachusetts) and consists of Republicans. The other was appointed by resolution of Wright Patman (Democrat of Texas).

It was Virkus and his organization who seven weeks ago started a survey of conditions among smaller plants and found that 64 per cent expected to be out of business before the end of the year if they do not get materials. In the past three weeks, the survey has spread to 42 states.

The survey here covered 1000 plants in Illinois, of which 95 per cent were in the metal working field, and which employed an average of 112 workers. Virkus said the operators of these plants are "bitter" over the Lend-Lease program which apparently is enabling England to carry on not only defense but "business as usual" while American business faces ruin.

Typical of the comments made by the 1000 plants surveyed so far are the following:

"We find a reluctance on the part of prime contractors to give out work. We have met their own prices on jobs and still do not get the business." — *manufacturer of embossing, stampings, dies, general engraving.*

"The bulk of our business is derived from the structural steel and railway field. Due to pressure brought to bear by the large companies in having their proprietary brands specified on the various defense projects it is virtually impossible for a small company to compete on this work." — *paint manufacturer.*

"There must be some item in the defense program that can be rolled on cold roll forming machines. We have several available, as well as two small punch presses."—*producer of metal plating, weather stripping, etc.*

"Our factory is practically standing idle. We are anxious to get some of the defense orders; we are equipped to handle this and have made efforts to get some, but with no success." — *maker of window storm sash, screens, shades.*

"In our opinion present shortages and priority controls reflect gross mismanagement and wastefulness in defense activities."—*producer of scale and corrosion control chemicals and proportioning machines.*

Mr. Virkus will take his surveys to Washington for the inspection of the congressional committees.

OVER THE SUEZ: U. S. aircraft plants are looked to by the British to reinforce these Westland Lysander planes shown flying over the Suez Canal. This is the route by which the U. S. expected to bring manganese ore from Russian territory now reported captured by German troops.

Photo by Harris & Ewing

Auto Output Cut; Other Products on OPM Ax Schedule

Washington

• • • **The OPM made plans** this week to extend its program of curtailment to other durable goods industries after stipulating that passenger car production be reduced 26½ per cent for the four-month period ending Nov. 30. The agency, together with OPACS, also is formulating plans to distribute equitably materials remaining after defense needs are met and to check excessive advance buying by allotting the output of critical material to various industries. Such allocation, OPM promised, will be undertaken as quickly as possible.

Under the OPM order, the reduction in passenger car production for the next three months will average 26½ per cent for the industry as a whole below the comparable months last year. But

Turn back to page 64 for more details about effects of the curtailment of automobile production.

progressive curtailment in subsequent months may bring a 50 per cent reduction for the model year ending July 31, 1942. The OPM announcement made no estimate of the amount of steel and other materials that would be diverted to defense needs as a result of the curtailment order but by implication suggested that such diversion would be in part offset by a substantial increase in the output of motor trucks.

A blanket preference rating order will give truck manufacturers a rating of A-3 for obtaining steel and other materials, a move which is expected to allow truck manufacturers to increase their production by 200,000 units to meet an anticipated need for 1,189,000 trucks during the new model year that began Aug. 1.

If and when passenger car production is reduced by 50 per cent below the 4,297,000 units produced during the model year just ended, the amount of iron and steel consumed will be reduced by 2,652,150 tons through the elimination of critical materials in trim and other non-functional parts, according to OPM estimates. This includes 2,-

350,480 tons of carbon steel and 301,670 tons of alloy steel.

Elimination of other critical materials for the same purpose in the production of 2,000,000 passenger cars will reduce the consumption of gray iron by 496,510 tons; malleable iron by 115,920 tons; secondary aluminum by 500 tons; nickel by 300 tons; zinc by 25,000 tons; chromium by 2600 tons; copper by 40,000 tons; lead by 31,000 tons; and tin by 2600 tons.

While automobile production will be curtailed on an average of 26½ per cent for the industry as a whole, the larger companies—General Motors, Chrysler and Ford—will effect a reduction of 27.6 per cent. Other companies — Studebaker, Hudson, Nash, Packard, Willys-Overland and Crosley—will curtail production by 20.2 per cent.

In granting to truck manufacturers an A-3 preference rating, the same rating previously given freight car manufacturers, there were some indications that the suggested figure of 1,189,000 trucks for the new model year may be revised upward. This appeared likely since truck production will be based not only on Army and Navy requirements but on needs under the lend-lease program, under the aid-to-Russia proposal, and to meet "vital transportation needs" in this country.

In any event, OPM officials are pointing to the heavy demand for trucks as one factor expected to minimize the effect of passenger car curtailment on the industry and its employees. Other factors looked to as a means of cushioning the shock include the proposed transfer of workers to defense plants now being constructed by the automobile industry, and the diversion of automobile production facilities to defense work. OPM Associate Director Sidney Hillman has received a CIO proposal accepted by management for re-hiring and retraining workers furloughed by the curtailment order.

Toledo Opens Water System

Toledo

• • • **Three days of** dedication ceremonies, Oct. 3, 4 and 5, will open the largest public improvement project in Toledo's history, the new $9,880,000 Lake Erie Water Supply System.

THIS WEEK'S

Prices and Priorities

OPM—Further increase of 600,000,000 lb. in nation's annual capacity **to produce alumina** recommended. Expansion would involve four plants costing $52,000,000. (PM982)

OPM—Slab zinc pool for September put at 27 per cent of July output; zinc oxide pool set at 10 per cent. No zinc dust is to be put into the pool in September. (PM997)

OPM—Priority ratings of A-5 given to **steel drum and container** manufacturers to permit industry to fill defense orders. Such a rating estimated to permit operations at two-thirds normal pace. (PM995)

OPM — Farm Machinery and Equipment Rating Plan announced. Preference rating of A-10 given for materials necessary for production of parts for repair and maintenance of existing farm equipment; rating of B-10 given for supplies for construction of new farm machinery. (PM985)

OPM—Aircraft, automobile and OPM officials met in Cleveland recently to study possibility of utilizing **aluminum ware industry** facilities for defense work. (PM926)

OPM—Revised edition of Priorities **Critical List** issued. New listing is broken down into two sections — raw materials and finished products. (PM955)

OPM—Construction of **1757 homes** for defense workers and enlisted personnel approved in seven localities with public funds. (DH185)

OPACS—West coast makers of **paperboard** have agreed to continue until Dec. 31 prices in effect in June (PM972)

OPACS—Suggest possibility of establishing price ceilings on **goat and kid skin** tanners. Only small percentage of output is for defense. (PM974)

OEM—In an effort to determine quantities and location of **strategic metals** in United States, 65,000 questionaires are being sent to users of such materials. (PM973)

OPACS—Allocation of available supplies of **Freon refrigerant** gases announced. Distribution to civilian makers of civilian refrigeration and air-conditioning equipment will be on basis of importance to public welfare. (PM977)

OPM—Effort to head off possible **unemployment** due to priorities and undue concentration of defense orders underway. Defense Contract Service set up as independent bureau of OPM. (PM976)

OPM—Thomas B. McCabe, president of Scott Paper Co., Chester, Pa., appointed deputy director of Division of Priorities in charge of operations. (PM967)

OPM—Representatives of six major groups of **furniture manufacturing** industry met last Thursday with OPM officials to consider how industry can meet steel shortage. (PM980)

OPACS — Ocean freight rate increases proposed between United States and Hawaii have been postponed 30 days for further study. (PM978)

OPM—Eight representatives of manufacturers of **automotive parts** added to Automotive Defense Industry Advisor Committee. (PM 970)

OPACS—Ceiling prices which restore quotations for Pennsylvania grade **crude oils** to levels prevailing before the Aug. 14 increase were announced on Aug. 23. (PM1003)

OPM—Chlorinated hydrocarbon refrigerants placed under priority control on Aug. 23. After defense requirements, residue will be distributed to civilian users in following order of preference: (1) Equipment already installed in hospitals, clinics, etc.; (2) industrial units already installed; (3) other units installed but not in group 1 or 2; and (4) new equipment not yet installed. (PM1007)

OPM—Several technical changes in general preference order covering **chromium** announced on Aug. 23. (PM1008)

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Copy of text of any of above official announcements can be obtained by writing the Reader Service Department, THE IRON AGE, *100 East 42nd Street, New York. Give number of order when writing, as PM995, etc.*

Ingot, Blast Furnace Capacity Increased

• • • **Spurred by the** urgent demands of the defense program, steel making capacity in the U. S. was increased almost 2,000,000 tons in the first six months of the current year, making a total gain of nearly 4,500,000 tons, of new capacity installed in the past year and a half, according to the American Iron and Steel Institute.

Installations of new equipment during the first six months of this year raise the industry's total annual capacity as of June 30, 1941, to 86,148,700 tons of steel ingots and castings. At the close of 1940, the nation's steel capacity was rated at 84,152,000 tons per year.

Capacity is ordinarily rated by the institute only as of the close of a year, but the substantial additions to capacity which went into operation during the first half of 1941 made advisable a survey of capacity as of mid-year.

Blast furnace capacity of the industry was increased by 300,000 tons during the first half of this year, and is now rated at 57,937,000 tons of pig iron and ferroalloys per year. Plans are now being considered to construct an additional 6,500,000 tons of blast furnace capacity.

Present steelmaking capacity of the industry is 18 per cent greater than the 72,985,000 tons of capacity available in 1929, and exceeds by fully 40 per cent the total of 61,021,000 tons of capacity available in 1918.

Of the total tonnage of new steel capacity which was put into operation during the first half of this year, about 1,500,000 tons represented additional open hearth furnace capacity and 686,000 tons represented the capacity of new electric furnaces. Bessemer steel capacity was reduced slightly as one converter, installed largely for experimental purposes, was dropped from the list.

Total capacity for producing steel by the open hearth process is now rated at 76,097,130 tons per year, a new peak. Capacity of the industry's electric furnaces, used primarily to produce high quality alloy steels, is now 3,272,370 tons, likewise the highest on record. In the past year and a half, electric furnace capacity has risen nearly 75 per cent. Bessemer steel capacity as of June 30, 1941, is rated at 6,793,400 tons per year.

Foundry Equipment Orders Show Sharp Rise in July

Cleveland

• • • **Orders for foundry** equipment showed a sharp rise in July, according to the Foundry Equipment Manufacturers Association here. The association reports that its order index for July was 358.1, as compared with 281.1 in the preceding month and 377.2 in April, the latter being the current year's highest index.

Orders for new equipment were responsible for the bulk of the rise. The index covering new equipment rose to 368.4 in July from 273.3 in June. The index covering repairs only gained to 326.9 in July from 304.7 in the previous month.

Steel Ingot and Pig Iron Capacity Increased

Steel Ingots, Exclusive of Steel for Castings

Capacity as of	Open Hearth	Bessemer	Crucible	Electric	Total
Dec. 31, 1940	74,215,440	6,996,520	3,942	2,365,130	83,581,032
June 30, 1941	75,737,300	6,793,400	3,800	3,056,970	85,591,470
Increase	1,521,860	*203,120**	*142**	691,840	2,010,438

Blast Furnace Capacity

	Coke		Charcoal	
Capacity as of	Pig Iron	Ferro-Alloys	Pig Iron	Total
Dec. 31, 1940	56,522,370	980,660	106,560	57,609,590
June 30, 1941	56,838,310	992,300	106,560	57,937,170
Increase	315,940	11,640	.....	327,580

*Decrease.

Change Made in Composite Index of Finished Steel Prices

IN order to reflect the broad changes that have taken place with respect to the types of steel produced and the relative importance of each group, THE IRON AGE's finished steel price index has been revised to more fully appraise the nature of production for steel as it is constituted today. After careful weighting of the importance and sensitivity of each major steel group, ten classifications were selected, as follows: hot rolled strip, cold rolled strip, bars, plates, beams, hot rolled sheets, cold rolled sheets, wire, rails, and pipe. The combined tonnages of these products produced for sale during the past decade approximated 78 per cent of all finished steel products offered for sale, other than tin plate and galvanized steel. It was decided to eliminate the coated products from the index in order to make it more truly representative of the value of finished steel, per se, rather than expose it to the influence of the market prices of other metals, as well.

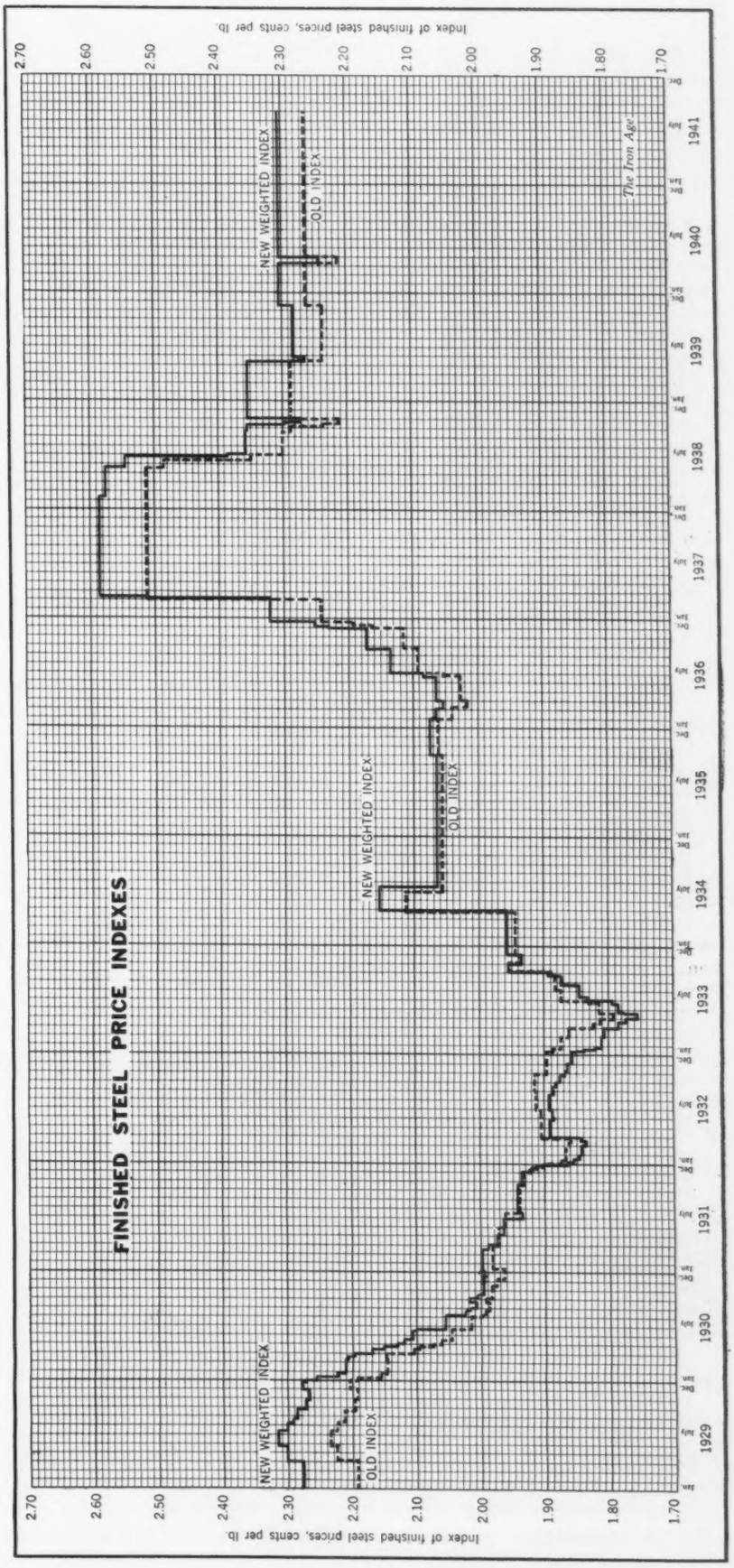
The importance of each price used in the composite index has been weighted in direct relationship to the tonnage sold during the past decade, so that its true weight upon the index is accurately reflected.

The sensitivity of THE IRON AGE's new finished steel composite index is reflected by the fact that during the 1929-1940 period it registered a low point of 1.7584c. in May, 1933, and a peak of 2.58414c. in March, 1937, whereas the former index indicated a low of 1.792c. in May, 1933, and a high of 2.512c. in March, 1937. Moreover, the new weighted price is expected to reflect future conditions more accurately when the defense emergency comes some time to its inevitable end.

The new and the old indexes are graphed on the opposite page, and the new weighted indexes, computed weekly for the period Jan. 1, 1929, to the present time, are as follows:

Week of:	Index
Jan. 8 to March 12, 1929, inclusive.	2.27758c.
March 19 to March 26, 1929, inclusive	2.27488c.
April 2 to May 21, 1929, inclusive..	2.30373c.
May 28 to July 9, 1929, inclusive...	2.31773c.

Week of:	Index
July 16 to Aug. 6, 1929, inclusive...	2.30373c.
Aug. 13 to Aug. 20, 1929, inclusive.	2.29353c.
Aug. 27 to Sept. 17, 1929, inclusive.	2.28613c.
Sept. 24 to Oct. 22, 1929, inclusive.	2.27063c.
Oct. 29 to Nov. 26, 1929, inclusive.	2.26498c.
Dec. 3 to Dec. 24, 1929, inclusive...	2.27898c.
Dec. 31, 1929	2.27158c.
Jan. 7, 1930	2.25488c.
Jan. 14 to Jan. 21, 1930, inclusive..	2.22398c.
Jan. 28 to March 11, 1930, inclusive	2.21248c.
March 18, 1930	2.20943c.
March 25, 1930	2.19818c.
April 1 to April 15, 1930, inclusive.	2.17029c.
April 22, 1930	2.15629c.
April 29, 1930	2.13459c.
May 6 to May 13, 1930	2.12864c.
May 20 to June 10, 1930	2.10759c.
June 17, 1930	2.10019c.
June 24 to July 29, 1930	2.05579c.
Aug. 5, 1930	2.05309c.
Aug. 12 to Aug. 19, 1930, inclusive.	2.02749c.
Aug. 26, 1930	2.01599c.
Sept. 2 to Sept. 23, 1930, inclusive..	2.00859c.
Sept. 30, 1930	2.02009c.
Oct. 7 to Oct. 14, 1930, inclusive...	2.00474c.
Oct. 21 to Nov. 11, 1930, inclusive..	1.99734c.
Nov. 18, 1930	1.99349c.
Nov. 25 to Dec. 2, 1930, inclusive...	1.98339c.
Dec. 9 to Jan. 6, 1931, inclusive...	1.97319c.
Jan. 13 to March 10, 1931, inclusive.	1.99629c.
March 17 to March 31, 1931	1.98889c.
April 7 to April 21, 1931, inclusive.	1.97449c.
April 28 to May 5, 1931, inclusive..	1.97179c.
May 12 to May 26, 1931, inclusive..	1.96639c.
June 2 to June 30, 1931, inclusive...	1.96091c.
July 7 to July 14, 1931, inclusive...	1.93666c.
July 21 to Oct. 20, 1931, inclusive..	1.94321c.
Oct. 27 to Nov. 24, 1931, inclusive..	1.93666c.
Dec. 1, 1931	1.92476c.
Dec. 8, 1931	1.91541c.
Dec. 15, 1931	1.91306c.
Dec. 22, 1931	1.89271c.
Dec. 29, 1931	1.86586c.
Jan. 5, 1932	1.85511c.
Jan. 12, 1932	1.85126c.
Jan. 19 to Jan. 26, 1932, inclusive..	1.84991c.
Feb. 2 to Feb. 23, 1932, inclusive...	1.84251c.
March 1 to March 8, 1932, inclusive.	1.83901c.
March 15 to March 22, 1932	1.84561c.
March 29 to May 24, 1932, inclusive.	1.89181c.
May 31 to June 28, 1932, inclusive..	1.88811c.
July 5 to Aug. 16, 1932, inclusive..	1.89196c.
Aug. 23 to Aug. 30, 1932, inclusive.	1.88456c.
Sept. 6, 1932	1.88509c.
Sept. 13 to Sept. 27, 1932, inclusive.	1.88239c.
Oct. 4 to Oct. 18, 1932, inclusive...	1.87499c.
Oct. 25, 1932	1.86801c.
Nov. 1 to Nov. 15, 1932, inclusive..	1.86701c.
Nov. 22 to Dec. 6, 1932, inclusive..	1.86331c.
Dec. 13 to Dec. 27, 1932, inclusive.	1.85961c.
Jan. 3, 1933	1.85691c.
Jan. 10, 1933	1.83921c.
Jan. 17 to Jan. 24, 1933, inclusive..	1.82161c.
Jan. 31 to Feb. 28, 1933, inclusive..	1.81151c.
March 7 to March 28, 1933, inclusive	1.80821c.
April 4 to April 11, 1933, inclusive.	1.78511c.
April 18 to April 25, 1933, inclusive.	1.77381c.
May 2 to May 16, 1933, inclusive...	1.75836c.
May 23 to June 6, 1933, inclusive...	1.78731c.
June 13 to June 20, 1933, inclusive.	1.78176c.
June 27, 1933	1.79306c.
July 5, 1933	1.83583c.
July 11 to Aug. 1, 1933, inclusive..	1.84258c.
Aug. 8 to Aug. 22, 1933, inclusive..	1.84643c.
Aug. 24 to Sept. 19, 1933, inclusive.	1.87233c.
Sept. 26, 1933	1.89808c.
Oct. 3 to Oct. 24, 1933, inclusive...	1.95578c.
Oct. 31, 1933	1.95054c.
Nov. 8 to Nov. 28, 1933, inclusive...	1.94737c.
Dec. 5 to April 17, 1934, inclusive..	1.95757c.
April 24 to July 3, 1934, inclusive..	2.15367c.
July 10, 1934, to Sept. 24, 1935	2.06492c.
Oct. 1, 1935, to Jan. 28, 1936	2.07642c.
Feb. 4 to March 3, 1936, inclusive..	2.06513c.
March 10 to March 31, 1936	2.05200c.
April 7 to June 23, 1936, inclusive..	2.06220c.
June 30, 1936	2.08530c.
July 7 to Sept. 22, 1936, inclusive..	2.13890c.
Sept. 29 to Nov. 24, 1936, inclusive..	2.17210c.
Dec. 1, 1936	2.23118c.
Dec. 8 to Dec. 21, 1936, inclusive...	2.25333c.
Dec. 28 to March 2, 1937, inclusive..	2.32263c.
March 9, 1937, to Feb. 8, 1938	2.58414c.
Feb. 15 to May 17, 1938, inclusive..	2.57754c.
May 24 to June 21, 1938, inclusive..	2.54494c.
June 28, 1938	2.38584c.
July 6 to Sept. 13, 1938, inclusive..	2.35944c.
Sept. 20 to Oct. 4, 1938, inclusive...	2.35367c.
Oct. 11, 1938	2.29917c.
Oct. 18, 1938	2.27207c.
Oct. 25 to May 9, 1939, inclusive...	2.35367c.
May 16, 1939	2.26689c.
May 23 to Nov. 21, 1939, inclusive..	2.28297c.
Nov. 28 to April 9, 1940, inclusive..	2.30467c.
April 16 to April 30, 1940, inclusive	2.24107c.
May 7, 1940, to Aug. 26, 1941	2.30467c.



Navy Seizure Ends Kearny Yard Strike

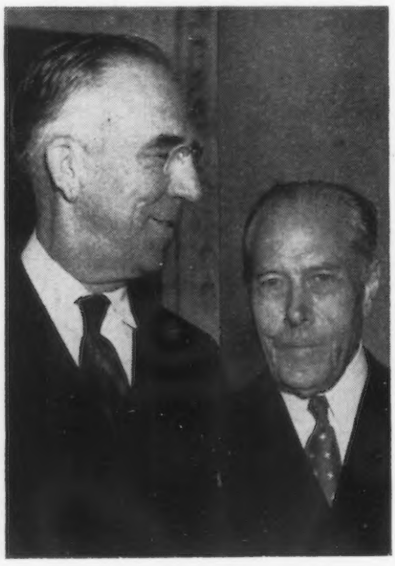
• • • **The Navy Department on** Monday began operation of the Kearny, N. J., plant of the Federal Shipbuilding & Dry Dock Co., putting an end to a strike which had lasted 15 days, affected between 15,000 and 18,000 men, and held up construction of nearly $500 million worth of ships for the Navy Department and the Maritime Commission.

Disagreement between the Industrial Union of Marine and Shipbuilding Workers (CIO) and the company, headed by L. H. Korndorff, president, hinged on the company's refusal to discharge workers not remaining in good standing with the union. Acceptance of this "modified union shop," differing from a closed shop in that it applies only to old employees who have already joined the union, and to all new employees, had been recommended by the National Defense Mediation Board. When the company refused to desert its stand, President Roosevelt personally intervened in an unsuccessful last minute attempt at conciliation. Company and union officials meanwhile had requested that the government take over the plant to end the impasse.

Just how government operation would affect union and management interests was doubtful. John Green, international president of the union, told strikers at a huge meeting on Sunday night that the government had agreed to the maintenance of union membership principle. However, Daniel S. Ring, labor relations advisor to the National Maritime Commission, announced that wages, hours and working conditions agreed on at the time union-company negotiations were broken off, formed the basis on which the plant would be opened. Admiral H. G. Bowen, who has been given charge of the plant by the Navy, indicated that the maintenance of union issue still remains to be settled between the union and the government.

Mr. Korndorff, whose status under the new set-up is in doubt, said: "Everything I have in the way of knowledge and experience regarding the Federal Shipbuilding & Dry Dock Co. will be at the disposal of the Navy Department." Also in doubt was the financial arrangement of the government with the company, although Mr. Korndorff, in a letter sent Monday to Secretary Knox, offered to sell the plant to the government, and disavowed, on behalf of the company, all "authority or responsibility for the further management and operation of the yard or for any results or consequences."

Unlike the government's seizure of the North American Aviation Company's Inglewood, Cal., plant last June, the only other large industrial plant to be taken over by the Government to end a labor dispute, the Kearny seizure took place without turmoil. Instead of the 2500 soldiers with fixed bayonets, who forced opening of the Inglewood plant, an admiral in a station wagon, and a telegram to the eight pickets on duty Sunday afternoon effected the taking over of the plant.



NEW KEARNY HEAD: Rear Admiral Harold G. Bowen (top), former chief of the Navy's Bureau of Engineering, on Aug. 25 was placed in charge of operations at the Federal Shipbuilding & Drydock Co. yards at Kearny, N. J. The plant, owned by U. S. Steel Corp., had been closed by a CIO affiliate strike in which the management refused to discharge non-dues paying union members. Below (left) are L. H. Korndorff, Federal shipbuilding president, and (right) Myron C. Taylor, former U. S. Steel chairman, who last week returned to the labor relations arena to help settle the strike. The Kearny "seizure" was the second such move by the government in 1941.

Photos by Wide World and Associated Press

White Collar Workers Covered By National Tube, SWOC Pact

Pittsburgh

• • • **The SWOC and** National Tube Co. have signed contracts potentially applicable to 1700 white collar workers in the company's plants at McKeesport and Ellwood City, Pa., and Lorain, Ohio, separate agreements being written for the three local unions in these mills. This is believed to be the first CIO white collar contract in the steel industry. A wage increase of $17 a month is provided as of Aug. 16, taking into consideration any adjustments of the same nature which were made last April in keeping with the 10c. an hr. increase given to hourly and day rate employees.

Diamond Alkali to Build Defense Magnesium Plant

Painesville, Ohio

• • • **The Diamond Alkali Co.,** Pittsburgh, is preparing to build and operate a $10 million magnesium plant here with an annual capacity of from 30,000,000 to 40,000,000 lb., officials of the metals section of the OPM have announced. The Defense Plant Corp. will hold title to the property.

The new plant will use an electrolysis process, extracting the metal from brine, which will be pumped from the earth at the plant.

Freight Car Output Is 50% of Capacity

• • • **Freight car shops** in the United States produced cars at a rate of approximately 50 per cent of actual capacity in July. On the basis of theoretical capacity, production was slightly less than 50 per cent. Production in June was also approximately 50 per cent of capacity. Preliminary information indicates August production will not be much higher than July's despite the priority rating of A-3 for car builders and the attention given this question by steel, car building, railroad, and government officials.

Due to lack of steel, some car plants were still shut down early this week while others were operating at less than 50 per cent of capacity. Close to maximum production is apparent at such centers as Chicago, St. Louis, and Bessemer, Ala. However, it is reported that western Pennsylvania and some other districts are below capacity operations.

Car builders are still attempting to get specific relief from Washington and some form of actual allocation of steel requirements is expected soon. Steel producers report that the heavy volume of priority orders higher than A-3 has prevented satisfaction of car builders' requirements.

Further Tin Plate Coating Reduction is Planned

Philadelphia

• • • **One of the nation's** largest producers of tin plate indicates that efforts are being made to reduce the thickness of the tin coating on their products to save current supplies of tin. This reduction will be in addition to that ordered by OPM earlier this year.

Army Gasoline Cans Now Being Lacquered

Washington

• • • **The Army's new 5-gal** gasoline cans are being lacquered instead of galvanized with zinc. They are coated inside with a clear, high-baked synthetic lacquer resistant to gasoline and water.

New Supply of Steel Form PD-73 Ready

DEMAND for copies of the OPM's iron and steel consumers' form PD-73, which must now be attached to every order or contract for carbon and alloy steels, has exhausted the first reprinting of the form by THE IRON AGE.

A new supply of full sized reprints of PD-73, as it appeared on pages 81a-81B of the Aug. 14 issue of THE IRON AGE, has been obtained and emergency copies will be provided for at the following prices:

25 copies or fewer	75c. for the lot
50 copies	$1.25 for the lot
100 copies	1.75 for the lot
Additional hundreds	1.25 per hundred

To avoid small bookkeeping entries, please send stamps to THE IRON AGE, 100 E. 42nd St., New York, for the quantity you want.

Republic to Build 4 Blast Furnaces, Expand Mine Output

Washington

• • • **Construction with** Federal funds of four new blast furnaces with a total annual capacity of 1,572,000 tons of pig iron, to be operated by Republic Steel Corp., was approved by Jesse Jones, Federal Loan Agency administrator. The four furnaces, to cost $58,312,000 with coke ovens and other equipment, are part of the OPM drive to boost pig iron capacity by 6,500,000 tons annually (see THE IRON AGE, July 31, p. 69).

These four Republic furnaces, together with one to be built by Carnegie-Illinois Steel Corp. at Braddock, Pa., previously announced, will provide an increase of 2,500,000 tons in annual pig iron capacity.

Originally, as previously pointed out in THE IRON AGE, the four-furnace allocation to Republic called for one each at Cleveland, Youngstown, and Gadsen, and Birmingham, Ala., but the plan to build a furnace at Birmingham was abandoned and a decision was reached to build two at Cleveland.

At Warren, Ohio, will be built by-product coke oven capacity to supply the increased capacity at Youngstown. Additional by-product coke oven capacity will be installed at Cleveland and Gadsen. Sintering plants also will be built and mining operations will be further developed at Port Henry, N. Y., and Birmingham. While the bulk of the new facilities will not be producing iron for from 10 to 15 months, Republic officials expect the Birmingham unit to be in operation shortly.

Steel Assured for Drum Manufactures

Washington

• • • **The OPM Division of** Purchases last week announced a program by which manufacturers of steel drums and other containers will be able to obtain enough steel through A-5 priority ratings during September and October to fill defense orders for the petroleum and chemical industries. At the same time the division disclosed a program to switch furniture manufacturers to defense work and to the conservation of steel and other materials through simplification of furniture lines and styles.

Pending completion of a permanent program a committee representing the industry was told that the 54 manufacturers of steel drums should make out and submit Forms PD-1 for their requirements to meet orders for chemical and petroleum products during September and October on the basis of two-thirds of the normal rate. Their orders will then be eligible for A-5 priority ratings. OPM statisticians are now tabulating information obtained through questionnaires which will show what percentage of the industry's output is used by the oil industry; what percentage is used for protective coatings and chemicals; and what percentage is used for food products.

When that information is fully tabulated, OPM officials will determine the extent to which materials other than steel could be used.

War Orders Prevent Illinois Stove Industry Shutdowns

St. Louis

• • • The government is going to see to it that the Belleville, Ill., stove industry, which employs about 2200 workers and has an annual payroll of $3,000,000, does not close down, as has seemed likely. OPM and the War Department have promised to allocate defense orders to the industry and to find jobs in other industries for those who cannot obtain jobs in Belleville.

St. Louis Car Co., which already had a large backlog of defense orders, has been awarded an additional $744,000 contract for ammunition cars by the War Department.

Thus far no total shutdowns of foundries or other plants in the St. Louis industrial area have been caused by scarcity of pig iron. Some non-defense operations, however, have begun to feel the pinch of scarcity. Inventories have been heavily drawn on, and in some instances have about reached the vanishing point.

Carl Bauer, president of Missouri Rolling Mill Corp., who offered to dissolve the firm if his employees wished it after a shutdown by strike June 24, has announced that the strike is over and work has been resumed.

Gray Iron Founders Open Washington Office

Cleveland

• • • **Directors** of the Gray Iron Founders' Society have decided to open at once a branch office in Washington to insure the fullest cooperation of the members of the Gray Iron Founders' Society with defense agencies, to expedite the transmission to its members of the various orders and rulings of the Administration and to assist its members in their work with the government as far as practicable.

W. W. Rose, Executive Vice President of the Gray Iron Founders' Society, will be in active charge of the office, the address of which will be announced later. The main office in Cleveland will operate as usual under the supervision of John Vickers.

British Steel Orders Given A-2 Priority

Pittsburgh

• • • Reflecting the seriousness with which Washington officials view the necessity for promptly completing British orders under the Lease-Lend Act, all steel orders for Great Britain have recently been granted an A-2 priority. This rating, it is understood, creates additional problems for steel officials in charge of making up equitable rolling mill schedules and puts British requirements ahead of freight car building needs which were assigned an A-3 rating some time ago.

The vast majority of British tonnage involves semi-finished steel, which in some cases has had to be taken away from finishing mills making products either with a lower priority rating or without any. This action has in some cases caused a partial shutdown of some finishing units such as bar mills.

Defense Clinic Planned For Small Eastern Plants

• • • **Declaring that the National** Defense Clinic to be held Sept. 22, 23 and 24 at Grand Central Palace, New York, will play an important role in OPM's new policy of pressing vigorously to spread defense production, W. O. Crabtree, district manager of the OPM's Defense Contract Service, today invited all small manufacturers in the East wishing to attend to register at once by letter for the clinic. Registrations should be sent to the Defense Contract Service, 33 Liberty Street, New York, to give DCS engineers a chance to analyze production facilities in advance of the Clinic, it was explained. Small firms from New England, New York, New Jersey, and Pennsylvania are expected to attend.

Allegheny Ludlum Offers Use Of Film on Steel in Defense

• • • **The Allegheny Ludlum Steel** Corp., Oliver Building, Pittsburgh, will lend to outside groups a 16 mm., 800-ft. sound film, "There's a Job to be Done," dealing with stainless and special steels and their place in defense.

Defense Rating Given Farm Machinery Makers

Washington

• • • **Both a defense rating,** A-10, and a civilian rating, B-1, for the production of new farm machinery, equipment and maintenance of existing machines were announced last week by OPM Director of Priorities E. R. Stettinius, Jr. The defense rating order covers deliveries of materials necessary for the production of parts for the repair and maintenance of existing farm equipment. The other order, issued by OPACS, assigning the highest civilian rating, covers deliveries of priority critical list materials to a manufacturer for the production of new farm machinery. Hand tools, it was stated, do not fall within the scope of the orders.

A manufacturer who is finding it difficult or impossible to obtain materials necessary for the manufacture of new machinery, or of spare parts, and wishing to avail himself of the assistance offered by the plan, should apply to the Director of Priorities on Form PD-88. Provision is made on this form for applying for one or both of the ratings to be assigned under the plan.

The completed application should be forwarded to the OPM Automotive, Railroad and Agriculture Equipment Branch.

Shell Loading Begins at $46 Million Ravenna Plant

Cleveland

• • • First shell loading operations at the $46,000,000 plant built near Ravenna, Ohio, during the past 11 months were scheduled to begin this week. Large piles of shell components have been on hand at the new plant for some time. Full operations are not scheduled until a later date. About 18,000 tons of structural steel have been used in building the new shell loading plant up to the present time, and about 15,000 tons of steel rails have been required. All door latches and hinges, as well as all building joints, have been grounded to avoid the danger of sparks, a procedure requiring tremendous amounts of welding rod.

Government Awards . . .

War Dept., Ordnance:

William Ainsworth & Sons., Inc., Denver; compasses $148,307
Aircraft Screw Products Co., Inc., Long Island City, N. Y.; parts for tools, inserts and screws.... 2,469
American Brass Co., Torrington, Conn.; tubing, brass 4,275
cartridge brass 20,017,918
brass discs 1,756,628
American Car & Foundry Co., Berwick, Pa.; armor plate 2,238
American Chain & Cable Co., Inc., American Cable Div., Wilkes-Barre, Pa.; cables, towing..... 1,495
American Locomotive Co., New York; springs, counter recoil... 5,468
American Locomotive Co., Railway Steel Spring Division, New York; springs 1,002
American Mfg. Co. of Texas, Fort Worth, Texas; shells 2,550,000
American Shim Steel Co., New Kensington, Pa.; steel 5,755
American Steel & Wire Co., Chicago; steel 17,392
Ampco Metal, Inc., Milwaukee; castings, bronze and aluminum. 1,975
Arcade Malleable Iron Co., Worcester, Mass.; castings, high test malleable iron 7,013
Arguto Oilless Bearing Co., Philadelphia; stems, punches and dies 4,580
Associated Spring Corp., Barnes Gibson Raymond Division, Detroit; springs, helical, for gun carriage 6,120
Babcock & Wilcox Tube Co., Beaver Falls, Pa.; tubing 5,074
Barber-Colman Co., Machine & Small Tool Division, Rockford, Ill.; reamers, chambering 2,560
Belmont Smelting & Refining Works, Inc., Brooklyn; copper ingots 1,109
Bendix Aviation Corp., Eclipse Aviation Div., Bendix, N. J.; parts for tanks 8,473
Bendix Aviation Corp., Scintilla Magneto Division, Sidney, N. Y.; parts for axles, breakers, blocks and bushings 91,210
Bethlehem Steel Co., Bethlehem, Pa.; breech-blocks 10,257
Bishop & Babcock Mfg. Co., Cleveland; shells 2,096,766
Black & Decker Mfg. Co., Towson, Md.; tools 2,253
Boonton Machine Shop, Boonton, N. J.; sheet lead 3,000
Bridgeport Brass Co., Bridgeport, Conn.; discs, cartridge brass .. 758,827
rod, brass 2,553
Bristol & Martin, Inc., New York; gages 1,465
Brown Co., Portland, Me.; conduit 1,091
Brown-Lipe Gear Co., General Drop Forge Division, Buffalo; forgings, drop 1,925
Brown & Sharpe Mfg. Co., Providence; machines milling 8,412
Buda Co., Harvey, Ill.; parts for tanks 3,390,072
Budd Induction Heating, Inc., Detroit; shells 160,500
Budd Wheel Co., Detroit; hub caps, brake drums, etc. 9,197
hub assys. 6,192
A. S. Campbell Co., Inc., Boston; cartridge cases 1,864,000
Carnegie-Illinois Steel Corp., Chicago; steel 58,939
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati; machines 5,068
City Engineering Co., Dayton, Ohio; gages 2,581
Colt's Patent Fire Arms Mfg. Co., Hartford; parts for guns 685,672
Compress Buckle Co., Attalla, Ala.; shells 920,000
Conmar Products Corp., Newark; gages 14,403
Crawford Mfg. Co., Inc., Kansas City; casts, steam condensing device 1,295
Crescent Truck Co., Lebanon, Pa.; trucks 10,104
Crucible Steel Co. of America, New York; steel 65,646
Henry Disston & Sons, Inc., Tacony, Philadelphia; armor plate 59,290
Doehler Die Casting Co., Pottstown, Pa.; fuzes, dummy 4,805
Drive-All Mfg. Co., Detroit; gear boxes 49,608
Eaton Mfg. Co., Detroit; springs. 2,114
Edgcomb Steel Co., Philadelphia; steel 12,204
Ex-Cell-O Corp., Detroit; tools, machine 34,710
tools, cutting 22,687
A. B. Farquhar Co., Ltd., York, Pa.; mounts, mortars and parts 553,111
Federal Tool Corp., Chicago; gages 2,280
Gairing Tool Co., Detroit; mills, hollow; cutters; and reamers .. 2,046
General Bronze Corp., Long Island City, N. Y.; brackets, sight ... 65,872
General Motors Corp., Guide Lamp Division, Anderson, Ind.; cartridge cases 3,061,000
Gold Seal Electric Supply Co., Philadelphia; lead 6,226
Greenfield Tap & Die Corp., Greenfield, Mass.; gages 8,005
H. A. K. Products Corp., Ft. Lauderdale, Fla.; shells 760,000
Louis Hanssen's Sons, Davenport, Iowa; jacks, push and pull screws 1,545
pliers 1,053
Harvey Metal Corp., Chicago; brass forgings 57,050
Hesse Machine & Mfg. Co., Inc., Boston; gages 1,277
Hydraulic Press Mfg. Co., Mount Gilead, Ohio; repair parts for presses 4,407
Illinois Tool Works, Chicago; cutters 4,504
Imperial Brass Mfg. Co., Chicago; parts for tanks 1,151
Indianapolis Machinery and Supply Co., Inc., Indianapolis; machines, milling 3,760
Inland Steel Co., Chicago; bars, steel 542,314
Johnson Claflin Corp., Marlboro, Mass.; gages 2,409
Jones & Lamson Machine Co., Springfield, Vt.; lathes 1,832
Jones & Laughlin Steel Corp., Pittsburgh; steel 71,695
Kearney & Trecker Corp., West Allis, Wis.; milling machines .. 966,889
Kennedy-Van Saun Mfg. & Engineering Co., Danville, Pa.; lathes 929,700
H. R. Krueger & Co., Detroit; machines, facing 8,985
Lincoln Park Tool & Gage Co., Lincoln Park, Mich.; gages 23,663
Mack Mfg. Corp., Long Island City, N. Y.; transmission and drive assemblies for tanks 4,674,969
Manistee Iron Works Co., Manistee, Mich.; presses 1,153,239
Marlin - Rockwell Corp., Jamestown, N. Y.; bearings, ball ... 1,647
Mercury Mfg. Co., Chicago; trailers 1,384
Midvale Co., Nicetown, Philadelphia; steel forgings & tubes .. 2,261,776
Minneapolis - Honeywell Regulator Co., Brown Instrument Div., Davenport, Iowa; controls, recording 1,368
Modern Tool & Die Co., Philadelphia; gages 1,200
J. W. Moore Machine Co., Everett, Mass.; gages 1,714
Moore Machinery Co., Los Angeles; machines, milling 3,060
machines, boring 29,151
Morse Tool Co., Inc., Detroit; tools 125,774
Motor Tool Mfg. Co., Detroit; tools 46,869
National Automatic Tool Co., Richmond, Ind.; machines, drilling.. 40,006
National Tube Co., Christy Park Works, McKeesport, Pa.; bombs 4,141,590
National Twist Drill & Tool Co., Detroit; cutters 2,298
Niles-Bement-Pond Co., Pratt & Whitney Division, Hartford; gages 5,379
Northern Sales Co., Philadelphia; files 1,202
Ohio Tool Co., Cleveland; gages. 35,138
Oliver-Barth Jack Co., Milwaukee; jacks, lever type 1,505
Oliver Farm Equipment Co., Charles City, Iowa; tanks, gasoline 28,704
Otis Elevator Co., Buffalo; castings, steel 2,768
Otis Steel Co., Cleveland; plates, steel 15,490
steel 2,390
Phosphor Bronze Smelting Co., Philadelphia; rod, bronze 1,446
Poole Foundry & Machine Co., Baltimore; couplings 2,214
Precision Mfg. Co., New York; gages 14,177
Putnam Tool Co., Detroit; countersinks 2,695
Quality Tool & Die Co., Indianapolis; gages 3,713
Republic Steel Corp., Cleveland; blanks, forged or rolled 311,063
steel 65,605
bar, steel 6,267
Revere Copper & Brass Co., Inc., Chicago; bronze, manganese and brass 6,885
Roberts Numbering Machine Co., Brooklyn; gages 2,169
Roessler Machine Co., Elkins Park, Pa.; dies, punches and stems .. 4,281
Rotary Electric Steel Co., Detroit; steel 1,073
J. T. Ryerson Sons Co., Cambridge, Mass.; carbon steel ... 1,136
S. K. F. Industries, Inc., Philadelphia; roller-bearings 1,630
Schnitzer Alloy Products Co., Elizabeth, N. J.; couplings, pipe and tubing 4,099
Scintilla Magneto Div., Sidney, N. Y.; screws, springs, washers, disks, etc. 7,877
Servel, Inc., Evansville, Ind.; cartridge cases 797,297

Industrial Milestones

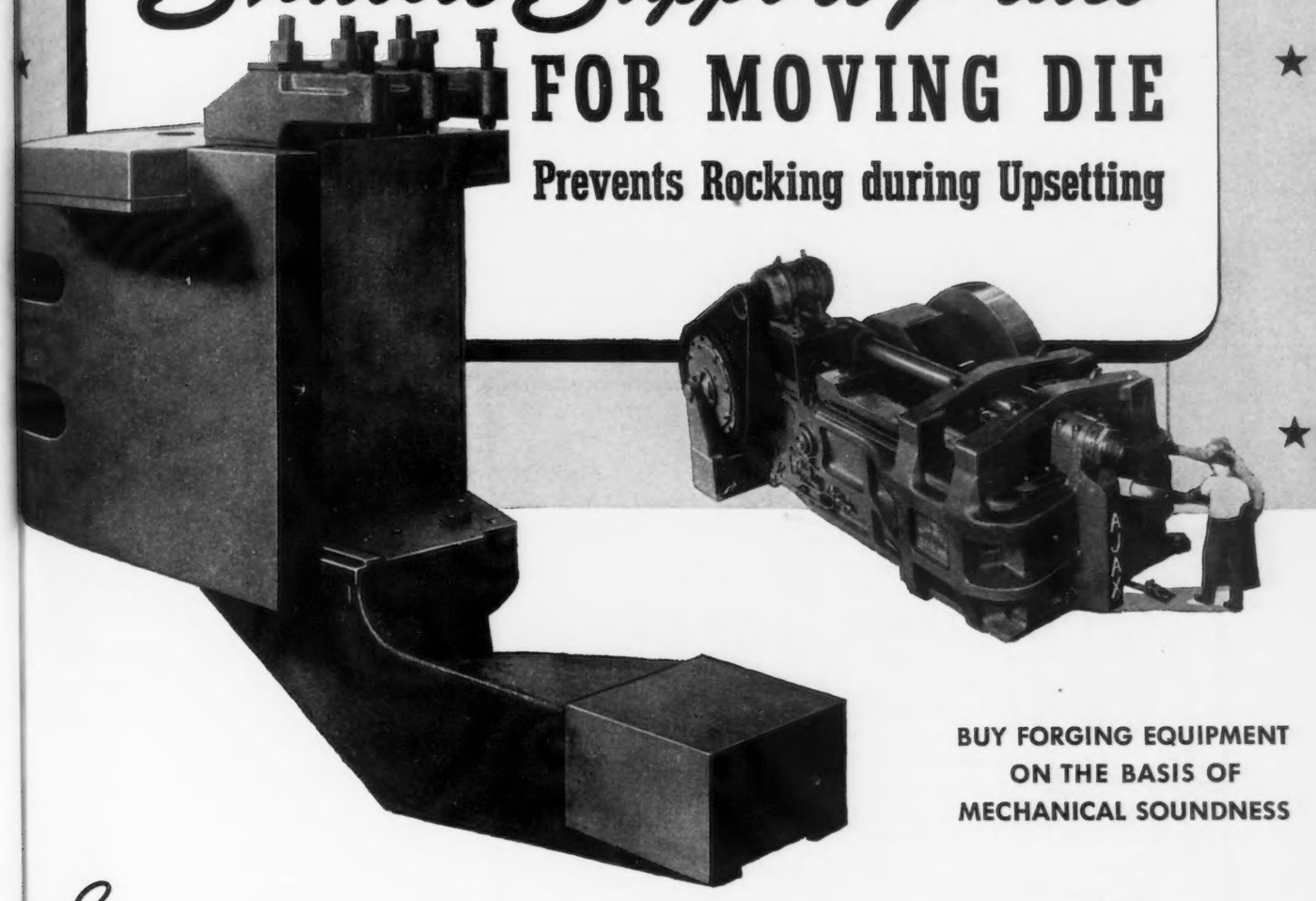
• • • **The Regal Mfg. Co.,** Coldwater, Mich., celebrated its 40th anniversary as a corporation on Aug. 14. One of the three oldest marine engine manufacturers in the United States, the firm was the outgrowth of the Shugars Cycle Co. It was originally organized, in 1901, as the Regal Gasoline Engine Co. but, in 1932, with development of the diesel engine, the name was changed to Regal Marine Engine Co., and in 1937, following diversification of products, the present name was adopted. The company is now devoting more than 90 per cent of its output to defense materials.

New and exclusive **AJAX**

Shuttle Support Plate

FOR MOVING DIE

Prevents Rocking during Upsetting



BUY FORGING EQUIPMENT ON THE BASIS OF MECHANICAL SOUNDNESS

EXPERIENCED USERS acclaim the new and exclusive Ajax Shuttle Support Plate for the Moving Die as the most significant improvement since Ajax introduced the Air Clutch. Its novel and rugged construction successfully prevents rocking of the moving die under the tremendous heading pressures developed on large machines.

In its closed position, overhanging the feed gap, the shuttle support plate is held positively square by a retaining cap at its extreme end providing rigid support to the moving die and assuring accurate matching of the die elements during upsetting. This advanced Ajax feature permits opening up the feed gap without loss of die alignment, taking full advantage of the die opening and affording greater convenience to the operator in handling large work into and out of the dies. The shuttle support plate is standard on three inch and larger Ajax Forging Machines.

The shuttle support plate, the shrouded outboard guide which gives three-point support for the die slide, accurate moving die alignment, and convenient provision for adjustment are features that merit your consideration of Ajax Forging Machines purely on the basis of mechanical soundness. Write for Bulletin 65-A.

THE **AJAX** MANUFACTURING COMPANY

EUCLID BRANCH P. O. CLEVELAND, OHIO

621 MARQUETTE BUILDING • CHICAGO, ILLINOIS

Seymour Mfg. Co., Seymour, Conn.; rod, nickel silver 1,147
Sharon Steel Corp., Sharon, Pa.; steel 9,492
Sheet Aluminum Corp., Jackson, Mich.; strips, spring tempered aluminum 10,804
Sheffield Corp., Dayton, Ohio; multichecks 638,035
gages 23,392
Stamford Rolling Mills, Springdale, Conn.; cups, brass 174,000
Standard Steel Spring Co., Blood Bros. Machine Co., Allegan, Mich.; parts for tanks 29,971
Star Cutter Co., Detroit; tools .. 13,530
Suburban-Essex Machinists, Inc., Orange, N. J.; pins, flush, lengths, rings, and gages 4,093
Taft-Pierce Mfg. Co., Woonsocket, R. I.; gages 5,427
Tinius Olsen Testing Machine Co., Philadelphia; machines, testing. 5,500
Tokheim Oil Tank and Pump Co., Ft. Wayne, Ind.; bomb bodies .. 2,094,870
Torrington Co., Torrington, Conn.; bearings 2,065
Union Mfg. Co., Memphis, Tenn.; gages 1,217
Union Steel Chest Corp., Le Roy, N. Y.; chests, steel 1,000
Union Twist Drill Co., Athol, Mass.; reamers 1,195
cutters 2,287
U. S. Machine Corp., Lebanon, Ind.; shells 1,259,000
Van Keuren Co., Watertown, Mass.; gages 3,740
Veeder-Root Co., Hartford; fuzes. 577,500
Veit and Young, Philadelphia; attachments for assembling machine 8,310
Vinco Corp., Detroit; gages 46,001
Wallingford Steel Co., Wallingford, Conn.; steel 9,457
S. K. Wellman Co., Cleveland; facings, clutch 16,057
Western Hardware and Specialty Mfg. Co., Milwaukee; grinders. 1,203
Willey's Carbide Tool Co., Detroit; tools 3,660
J. H. Williams & Co., Buffalo; wrenches, sockets for tanks ... 1,179
Winslow Mfg. Co., Stamford, Conn.; dies 5,400
Wright Aeronautical Corp., Paterson, N. J.; parts for tanks 5,555
Wyckoff Drawn Steel Co., Chicago; steel, molybdenum 1,129
steel 3,522
L. A. Young Spring & Wire Corp., Detroit; springs 1,818

War Dept., Corps of Engineers:

Addressograph - Multigraph Corp., Multigraph Division, Washington; frames, printing and dryers, whirler $4,976
Alban Tractor Co., Inc., Baltimore; construction machinery 12,498
plows 2,262
rollers 6,545
Allis-Chalmers Mfg. Co., Washington; tractors 8,036
Theo. Alteneder & Son, Philadelphia; scales 5,880
American Blue Print Co., Inc., New York; drafting instruments ... 122,198
American Fork & Hoe Co., Cleveland; shovels 16,200
American Steel & Wire Co., Washington; barbed wire 376,050
Anaconda Wire & Cable Co., Washington; cable 6,278
Austin-Western Road Machinery Co., Aurora, Ill.; cars, dump, railroad 12,193
"Automatic" Sprinkler Corp. of America, Youngstown, Ohio; sprinkler systems for warehouses and annexes, Patterson Field, Fairfield Air Depot, Osborn, Ohio 65,419
Birdsboro Steel Foundry and Machine Co., Birdsboro, Pa.; hydraulic forcing press with accessories, Aircraft Assembly Plant, Tulsa, Okla. 3,801
Bowen and Co., Inc., Bethesda, Md.; dividers 27,025
Charles Bruning Co., Inc., New York; surveying instruments .. 6,605
Buda Co., Harvey, Ill.; diesel electric generator sets 34,138
Carpenter Construction Corp., Norfolk, Va.; highway bridge, Great Bridge, Va. 214,812
Clark Tructractor, Battle Creek, Mich.; Clark utilitruc with tools 3,954
Cleveland Twist Drill Co., Cleveland; twist drills 3,874
Commercial Enclosed Fuse Co. of T. J., Hoboken, N. J.; fuses, cartridge 4,050
Commercial Shearing & Stamping Co., Youngstown, Ohio; pontoon treadways and pins 11,318
portable bridges 171,884
Crown Iron Works Co., Minneapolis; portable bridges 162,003
Eugene Dietzgen Co., Inc., Washington; dividers, rods and rules. 10,260
E. D. Etnyre & Co., Oregon, Ill.; distributors 3,850
Galion Iron Works & Mfg. Co., Galion, Ohio; roller repair parts 3,247
General American Transportation Corp., Chicago; cars, railroad, tank 1,287,000
General Electric Co., Washington; cable 5,950
Gilpin Construction Co., Portland, Ore.; bucket dredge, Ft. Stevens, Ore. 4,400
Greenville Steel Car Co., Greenville, Pa.; car, fire control 199,230
Gulfport Creosoting Co., Gulfport, Miss.; switchties 6,177
Haffner-Thrall Car Co., Chicago; cars, railroad, flat 26,000
Hamilton-Huster Machinery Co., Dallas; high-speed metal cutting band saws, Aircraft Assembly Plant, Tulsa, Okla. 2,163
radial drills, Aircraft Assembly Plant, Tulsa, Okla. 21,197
hand millers with accessories, Aircraft Assembly Plant, Tulsa, Okla. 2,719
armor plate iron worker with accessories, Aircraft Assembly Plant, Tulsa, Okla. 2,441
Industrial Construction Corp., Ltd., Los Angeles, Cal.; monorail system, aircraft assembly plant, Tulsa, Okla. 115,417
Ingersoll-Rand Co., Washington; spare parts, air compressors and accessories 38,438
parts for compressor 2,041
nail drivers and circular saws. 8,726

—Pittsburgh Post-Gazette

Photograph by Bud Scott

HE WANTS TO GO TO CLEVELAND WITH HIS "OLD MAN"

But dad's going to be pretty busy listening to technical papers by leading steel mill authorities, inspecting the latest equipment and design in mill machinery, and visiting the other fellow's plant to study how he handles his problems.

He's not the only little fellow who is going to be crying, because lots of "dads" are going to be in Cleveland for the Iron and Steel Engineers Convention and Exposition. These are strenuous times and all the "dads" from the steel plants know that they are going to hear and see things that will help them turn out more steel quicker, cheaper, and better.

Dad's going to get a lot out of this coming meeting. He realizes the vital importance steel production is to the nation's welfare and isn't going to shirk his duty by staying away from a convention that will be so helpful and stimulating to him in his daily work.

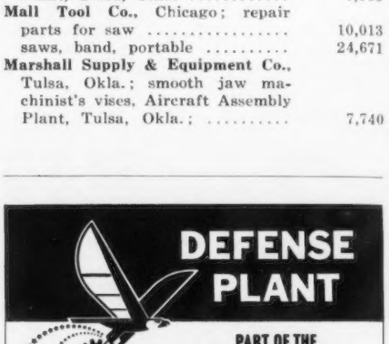
37th ANNUAL CONVENTION
AND IRON AND STEEL EXPOSITION

Association of Iron and Steel Engineers

CLEVELAND PUBLIC AUDITORIUM
September 23-24-25

★ ★ ★ ★

C. R. Jahn Co., Chicago; trailers.	176,756
Joslyn Co., New York; brackets, pole or house, malleable iron or steel	29,872
Keuffel & Esser Co., Hoboken, N. J.; measurers, map	4,774
rods, leveling	7,250
Machinery Sales Co., Los Angeles: high speed jig borers with accessories, Aircraft Assembly Plant, Tulsa, Okla.	7,905
Mall Tool Co., Chicago; repair parts for saw	10,013
saws, band, portable	24,671
Marshall Supply & Equipment Co., Tulsa, Okla.; smooth jaw machinist's vises, Aircraft Assembly Plant, Tulsa, Okla.;	7,740



FOR DEFENSE CONTRACT HOLDERS: The OPM has authorized all plants devoting half or more of their facilities to defense work to display the sign shown above.

turret lathes with equipment, Tulsa Aircraft Plant	25,944
Fred Medart Mfg. Co., St. Louis; warehouse equipment	2,213
Ohio Locomotive Crane Co., Bucyrus, Ohio; locomotive cranes	112,912
O.K. Clutch & Machinery Co. of Columbia, Pa.; hoists and hand winches	28,285
Arthur J. O'Leary and Son Co., Chicago; steel pickets and stirrups	7,215
"Quick-Way" Truck Shovel Co., Denver; cranes, truck mounted, attachments and trailers	383,076
Ransome Concrete Machinery Co., Dunellen, N. J.; pavers, road, concrete	20,675
St. Louis Car Co., St. Louis; cars, ammunition	744,600
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., Washington; table, drop, railroad	5,160
Charles G. Stott Co., Inc., Washington; lettering pens	21,000
Sullivan Machinery Co., New York; air compressors	7,224
Trailer Co. of America, Cincinnati; semi-trailers and dollies	1,126,778
Travelcar Corp., Detroit; semi-trailers	14,625
Triumph Mfg. Co., Chicago; galvanometers, blasting	15,300
Upson - Walton Co., Cleveland; blocks, steel	6,016
Virginia Bridge Co., Roanoke, Va.; bridges, portable	104,592
Wallace & Tiernan Co., Inc., Belleville, N. J.; cylinders, chlorine.	3,850
J. H. Weil & Co., Philadelphia; instruments, drawing & rulers.	2,348
thumb tacks and templates	5,860
Well Machinery & Supply Co., Inc., Ft. Worth, Texas; bench grinders and adjustable lamps, Aircraft Assembly Plant, Tulsa, Okla.	2,325
Westinghouse Elec. & Mfg. Co., Washington; panel resistors	7,000

Westinghouse Electric Supply Co., St. Louis; copper wire and cable, Scott Field, Illinois, and Jefferson Barracks, Mo. 12,853
Whitcomb Locomotive Co., Rochelle, Ill.; locomotives 5,372
Wire & Metal Manufacturing Co., Los Angeles; tie down anchors, Hill Field, Ogden, Utah 5,300
Wood Roadmixer Co., Alameda, Cal.; roadmixers 29,961
Yale & Towne Mfg. Co., Philadelphia; hoists 2,275
trucks 4,290

War Dept., Quartermaster Corps:

American Steel and Wire Co. of New Jersey, Cyclone Fence Division, Los Angeles; fencing and illumination, Camp Callan and Ft. Rosecrans, San Diego, Cal. $37,909
Autocar Company, Ardmore, Pa.; tractor-trucks 1,454,668
Arnold Brothers and Co., E. Weymouth, Mass.; 5000 lasts, hinge 7,950
Beier & Gunderson Co., San Francisco; safes, insulated 209
Belknap Hardware & Manufacturing Co., Inc., Louisville, Ky.; component parts for rolls, commissary; scales, weighing, bean, butchers 1,750
Fred J. Brotherton, Inc., Hackensack, N. J.; portable steel igloo magazines, Ft. Monmouth, N. J. 12,385
Corbitt Co., Henderson, N. C.; tractor-trucks 225,522
trailers, 4-ton 146,161
Diamond T Motor Car Co., Chicago; trucks 2,060,761
Fargo Motor Co., Detroit; trucks, ½-ton 131,067
Fruehauf Trailer Co., Detroit; semi-trailers 107,917
General Motors Corp., New York; spare parts 23,814
General Motors Corp., Chevrolet Division, Detroit; 5 passenger Lt. sedan cars 476,793
Harley Davidson Motor Co., Milwaukee; motorcycles 591,915
Haven Busch Co., Grand Rapids, Mich.; chain link fence, gates, posts, etc., Ft. Custer, Battle Creek, Mich. 8,029
International Harvester Co., Ft. Wayne, Ind.; trucks, 2½-ton .. 347,498
trucks 757,356
Henry A. Ivey, Decatur, Ga.; motor buildings, Ft. Benning, Ga.. 24,261
List and Weatherly Adv. Construction Co., Kansas City; continuous I-beam bridge, Fort Leonard Wood, Mo. 70,700
Marietta Mfg. Co., Point Pleasant, W. Va.; coast artillery boats .. 4,560,000
McGrew Machine Co., Lincoln, Neb.; 50,000 each component parts for stoves, tent arresters, spark 12,700
Merton Last Co., Cincinnati; 2,500 lasts, hinge 4,032
Packard Motor Car Co., Detroit; cars, medium, 5-passenger sedan 19,196
Philadelphia Depot Factory, Philadelphia; 24,000 brassards, military police 2,085
Remington Rand, Inc., San Francisco; safes, insulated 308
A. Schrader's Son, Brooklyn; converting tools 2,100
F. C. Stolte Co., Pacific Grove, Cal.; 100-foot steel flagpole, Hunter Liggett Military Reservation, Cal. 2,200
Vulcan Corp., Portsmouth, Ohio; 1500 lasts, hinge 2,475
Watson Automobile Equipment Co., Cincinnati; semi-trailers, 10 ton 14,105
Western Last Co., St. Louis; 5000 lasts, hinge 8,100
Wheeling Corrugating Co., Wheeling, W. Va.; 315,000 stovepipe hoods and straight joints 54,750
Wickwire Spencer Steel Co., San Francisco; chain link fence and gates, Hamilton Field, Cal. ... 8,500

Yellow Truck & Coach Mfg. Co., Pontiac, Mich.; tractor-trucks, 2½-ton 3,905
1 1/3-3-ton trucks 123,495

War Dept., Air Corps:

American Seating Co., Grand Rapids, Mich.; metal chairs $84,600
Blackmer Pump Co., Grand Rapids, Mich.; pumps 30,000
Cessna Aircraft Co., Wichita, Kan.; airplanes and spare parts 12,043,865
Corbin Cabinet Lock Co., American Hardware Corp., Suc., New Britain, Conn.; padlocks 50,485
Curtiss-Wright Corporation, Airplane Division, Robertson, Mo.; airplanes and spare parts 28,150,924
Curtiss-Wright Corp., Curtiss Aeroplane Division, Buffalo; servicing and assembling of airplanes .. 171,693
wing panel units 772,800
Dearborn Tool & Die Co., Dearborn, Mich.; machines 16,848
Denison Engineering Co., Columbus, Ohio; hydraulic test stand assemblies 616,737
stand assys. 88,630
Dowty Equipment Corp., Long Island City, N. Y.; assemblies. 759,200
General Motors Corp., Allison Division, Indianapolis; tool kits 100,000
Hardinge Brothers, Inc., Elmira, N. Y.; milling machines 82,166
Kinner Motors, Inc., Glendale, Cal.; engines and parts 745,342
North American Aviation, Inc., of Texas, Dallas; airplane maintenance parts 1,340,788
E. W. A. Rowles Co., Arlington Heights, Ill.; metal chairs 21,861
United Aircraft Corp., Pratt & Whitney Aircraft Division, E. Hartford; tools 51,347
U. S. Electrical Motors, Inc., Milford, Conn.; test stands 152,607
Yale & Towne Mfg. Co., Stamford, Conn.; pumps and motors 41,044
padlocks 115,127

War Dept., Medical:

American Medical Specialties Co., Inc., New York; sterilizer, hypodermic needles 88,840
American Sterilizer Co., Erie, Pa.; drums for sterilizer 7,187
J. Bishop & Co., Platinum Works, Malvern, Pa.; syringe needles .. 10,680
G. S. Blakeslee & Co., Cicero, Ill.; electric dishwasher 1,257
Cleveland Dental Mfg. Co., Cleveland; forceps, tooth extracting 2,250
Fred Haslam & Co., Inc., Brooklyn; surgical instruments 110,630
Kaufmann Distributing Corp., New York; fountains, drinking 536
Landers, Frary & Clark, New Britain, Conn.; knife, sabatier ... 1,291
Wm. Langbein & Bros., Brooklyn; forceps and needle holders. 38,100
National Enameling & Stamping Co., Baltimore; galvanized iron cans 909
Penn Surgical Mfg. Co., Inc., Philadelphia; surgical instruments 27,130
gouge, bone 7,030
forceps 19,870
Picker X-Ray Corp., Cleveland; x-ray field units 535,500
Ransom & Randolph Co., Toledo, Ohio; dental burs 48,685
Ritter Dental Mfg. Co., Rochester, N. Y.; dental engines 16,034
J. Sklar Mfg. Co., Long Island City, N. Y.; surgical instruments 7,440
Swartzbaugh Mfg. Co., Toledo, Ohio; electric food carts 12,845
Switzerland & Carson-Newton Co., Belleville, N. J.; surgical instruments 1,515
Torrington Co., Torrington, Conn.; surgical needles 48,668
Union Dental Instrument Mfg. Corp., Philadelphia; dental equipment 30,901
Edward Weck & Co., Inc., Brooklyn; forceps 150,860
Wheeling Corrugating Co., Martins Ferry, Ohio; galvanized iron cans 507

War Dept., Artillery Corps:

Anti-Corrosive Metal Products Co., Castleton-on-Hudson, N. Y.; hardware $1,157
Utica Cutlery Co., Utica, N. Y.; knives 900

War Dept., Signal Corps:

Conco Engineering Works Division, H. D. Conkey & Co., Mendota, Ill.; reels $8,790
Dieke Tool Co., Inc., Downers Grove, Ill.; bars 496

Defense Plant Building:

Brann and Stuart Co., Philadelphia; general storage depot, Marietta, Pa. $5,044,600
Elwood Ordnance Plant, Joliet, Ill.; 285,000
Ferro Concrete Construction Co., Cincinnati; test stands, Wright Field, Ohio 1,100,000
Foley Brothers, Inc., St. Paul, and **Walbridge-Aldinger Co.,** Detroit; Twin Cities Ordnance Plant, St. Paul 17,661,925

RFC With OPM On Need For More Steel Capacity

Washington

• • • **Commenting on** a steel expansion program, Federal Loan Administrator Jesse H. Jones said that "in general or in principle," RFC follows OPM recommendations for loans to finance construction. He stated that there may be differences as to details between the two government bodies, but that there is no difference concerning the need for greater steel capacity.

Asked about the building of 25 ore boats, recommended by OPM Director of Production John D. Biggers to the Maritime Commission as a part of expanded blast furnace capacity, Mr. Jones said means are being studied to create larger steel capacity. Announcement of the expansion program, he stated, will be made "whenever we get the details worked out. It's not a simple matter."

New Designations Adopted For Nickel, Chrome Alloys

• • • **A standard system of** designation for high nickel-chromium and straight chromium alloys used in heat and corrosion resistant castings has been adopted by the members of the Alloy Casting Institute. The designations cover the particular composition ranges most suitable for castings and were chosen to distinguish these alloys from those customarily used in wrought form. Printed copies of the list of designations may be obtained from the office of the Institute, 39 Broadway, New York.

Magnesium Processing Plant Planned for Nevada

Cleveland

• • • **Granted a $63,000,000** contract to construct a large magnesium processing plant in Nevada, Basic Magnesium, Inc., subsidiary of Basic Refractories, Inc., here, expects to be producing for defense purposes next year. The contract was made recently by the Defense Plant Corp. The Cleveland interests own deposits of magnesite ore near Luning, Nevada, and also near Llano, Tex.

Hufnagel Replaces Desvernine As Crucible Steel President

• • • **F. B. Hufnagel,** chairman of Crucible Steel Co. of America, announced on Monday the resignation of R. E. Desvernine as president and director of the company. Mr. Hufnagel has been elected president and will serve in that capacity as well as chairman.

Mr. Desvernine served as counsel to Crucible Steel prior to becoming president three and a half years ago. He was a partner in the law firm of Hornblower, Miller & Garrison, now the firm of Willkie, Owen, Otis & Bailly. Prior to Mr. Desvernine's tenure as president, that post, as well as that of chairman, was held by Mr. Hufnagel.

ANOTHER NEW SUB: The new $3 million submarine "Gato," pictured above, was launched last week by Electric Boat Building Co. at New London, Conn. The craft is over 300 ft. long and is one of a class of 11 being built there.

British Steel Export Agency Merged with Commission

• • • **The iron and steel** export division of the New York office of the British Iron & Steel Corporation, official British steel buying agency, will be merged with the British Purchasing Commission, it has been announced. After Sept. 1 the export section will be known as the British Purchasing Commission, Supply Directorate II.

Communications pertaining to export licenses should in the future be addressed to Capt. W. G. Coventry, License Control & Permit Division, 1333 F Street, N. W., Washington. The commission is also planning to open a New York office shortly to assist in arranging emergency shipments.

Falls Spring & Wire Buys Shell Manufacturing Firm

Detroit

• • • **Falls Spring & Wire Co.** has purchased the Compress Buckle Co., Attalla, Ala., which it will operate as a wholly owned subsidiary. William Hay Falls, president of the Detroit firm, will head the subsidiary, with John C. Hampton, of Detroit, acting as vice-president and general manager. The Alabama company holds an order for 4,000,000 20-mm. shells on which it expects to start production in October.

Sherwin-Williams to Run Illinois Ordnance Plant

Cleveland

• • • **The Sherwin-Williams** Defense Corp., set up by Sherwin-Williams Co., paint manufacturers, has received a contract from the War Department to manage, train personnel, and buy equipment for the Illinois Ordnance Plant being constructed at Crab Orchard, Ill.

Autocar Co. Bought By Liberty Aircraft Products

• • • **The Autocar Co.,** Ardmore, Pa., producer of heavy duty tractor trucks, scout cars and other defense products and commercial vehicles, has been purchased by Liberty Aircraft Products Corp., manufacturer of precision aircraft parts, New York, according to Oliver H. Payne, chairman.

PERSONALS

FREDERICK E. MUNSCHAUER, new president of Niagara Machine & Tool Works.

GEORGE R. KINNEY, vice-president of Niagara Machine & Tool Works.

• **Frederick E. Munschauer,** heretofore vice-president and treasurer of Niagara Machine & Tool Works, Buffalo, has been elected president. He has been identified with the company for 33 years. **George R. Kinney,** sales manager, has been made vice-president. He has served the company for 22 years.

• **William B. Given, Jr.,** has been elected president of the National Bearing Metals Corp., New York, succeeding **J. B. Strauch,** who has been made chairman of the board. Mr. Given is president of the American Brake Shoe & Foundry Co., which owns a controlling interest in the National Bearing Metals Corp.

• **Victor A. Hanson** has been appointed general sales manager of the Whitney Chain & Mfg. Co., Hartford, Conn. He has been assistant sales manager and field manager of the company.

• **Richard P. Swartz,** heretofore vice-president of Crown Can Co., Philadelphia, has been promoted to the special post of assistant to the president. He has been identified for over 20 years with Crown Cork & Seal Co., of which Crown Can is a subsidiary.

• **H. G. Smith** has been appointed executive engineer of the Buda Co., Harvey, Ill., in charge of automotive and industrial division and the radial diesel division. Mr. Smith was formerly chief engineer of the automotive division.

• **W. W. Hancock,** secretary and treasurer of Republic Steel Corp., and **P. F. Boyer,** comptroller, have been elected directors of the corporation, and both have been elected vice-presidents in addition to the offices now held.

• **O. B. Marsh,** for the past 15 years purchasing agent for the Penberthy Injector Co., Detroit, has been named production manager. **Howard D. Doran,** of the purchasing department, has been made purchasing agent in charge of all buying except raw materials. Mr. Marsh will retain control of this particular section of the purchasing department.

• **G. W. Behnke** has been elected president of the Simplicity Engineering Co., Durand, Mich., to succeed **L. C. Pemberton,** Lansing, who has resigned because of other business interests.

• **T. C. Couper,** formerly purchasing agent for L. A. Young Spring & Wire Co., Detroit, has been named sales manager of Plant No. 2 and assistant to **T. D. Stewart,** general manager. **Russell J. Wattels,** who has been in the purchasing department for the past eight years, now has complete charge of purchases for the company's plants in United States and Canada.

• **George Johnson, Jr.,** of the Enamel Products Co., Cleveland, has been transferred to Washington, where he will temporarily assist **Thomas Collins,** of the Washington office of the Porcelain Enamel Institute.

• **J. M. Franklin,** of Holt, Ala., manager of the Southern plants of the Central Foundry Co., which has home offices in New York, has been elected vice-president and a director of the company. A native of Birmingham, Mr. Franklin joined the Central Foundry Co. in 1926 as assistant superintendent of the Holt plant, one of the company's three plants in Alabama.

• **James W. Griffiths,** director of training and education for the Youngstown district of Carnegie-Illinois Steel Corp., will retire late this month after 39 years with the company. Mr. Griffiths, who will be 66 in November, began working in 1902 as a repairman on stationary engines.

• **Leo T. Tierney,** for many years associated with the Madison-Kipp Corp., Madison, Wis., has been appointed purchasing agent, succeeding **Ray Togstad,** who has resigned to engage in private business.

• **John H. Collier,** president, the Crane Co., has been elected to the board of trustees of the Illinois Institute of Technology, Chicago.

• **John L. Foley** has been appointed distributor in the Buffalo territory for Hobart Brothers Co., Troy, Ohio. He will make his headquarters at 313 Herman Street, Buffalo.

• **Dr. John Campbell,** technical director of the International Paper Co. since 1929, has resigned to join the Reynolds Metals Co., Richmond, Va., where he will be in charge of the plant efficiency department. He was graduated from Massachusetts Institute of Technology in 1921.

• **T. H. McSheehy** has been placed in charge of the Pacific Coast sales office of the Wickwire Spencer Steel Co., New York. He had previously been Chicago district sales manager of hardware products sales manager. **William M. Smith,**

formerly assistant sales manager of the Midwest district, has been appointed Midwest district sales manager for all products at the company's Chicago offices. **Percy Jenkins**, who was New England district sales manager since 1931, has been named sales manager of the hardware products department of the company's general offices in New York and **Charles R. Stephens**, formerly Pacific Coast sales manager and with Wickwire Spencer since 1920, returns to the East to become New England district sales manager for all products with offices in Worcester.

• **S. Wallace Murkland**, assistant comptroller of the Western Electric Co., New York, has been elected a director of the company and named comptroller to succeed **Richard H. Gregory** who has retired. **Stanley Bracken**, engineer of manufacture of Western Electric and president of the Teletype Corp., a subsidiary, has also been elected a director.

• **H. D. Scully** has resigned as Steel Controller and chairman of the Wartime Industries Control Board, according to C. D. Howe, Minister of Munitions and Supply. He will be succeeded by **F. B. Kilbourn**, M. E. I. C., vice-president and director of the Canada Cement Co., Ltd.

Coming Events

Sept. 4 to 6—National Association of Fan Manufacturers, summer meeting, Hershey, Pa.

Sept. 17 to 19—National Industrial Advertisers Conference, Toronto.

Sept. 18 to 20—Concrete Reinforcing Steel Institute, annual meeting, Colorado Springs.

Sept. 23 to 26—Association of Iron and Steel Engineers, annual exhibition and meeting, Cleveland.

Sept. 25 and 26—Society of Automotive Engineers, National Tractor Meeting, Milwaukee, Wis.

Sept. 25 and 26—Powdered Metallurgy Conference, annual meeting, Cambridge, Mass.

Sept. 29 to Oct. 2—American Mining Congress-Metal Show, San Francisco.

Oct. 1 to 4—Electrochemical Society, Fall Meeting, Chicago.

Oct. 6 to 10—National Safety Congress and Exposition, Chicago.

Oct. 8 to 10—Porcelain Enamel Institute, annual forum, Chicago.

Oct. 14 to 16—American Railway Bridge and Building Ass'n, Chicago.

Oct. 14 to 17—American Institute of Steel Construction, annual convention, New York.

Oct. 16 to 18—American Society of Tool Engineers, semi-annual meeting, Toronto.

Oct. 19 to 24—American Welding Society, annual meeting, Philadelphia.

Oct. 20 to 22—American Gas Association, Atlantic City, N. J.

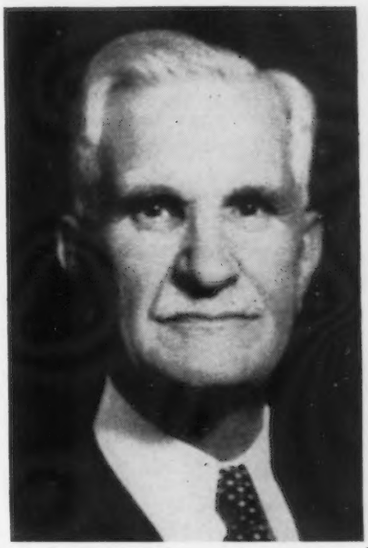
Oct. 20 to 24—National Metal Congress, Philadelphia.

D. G. BAXTER, whose appointment as general superintendent of the Warren, Ohio, plant of Copperweld Steel Co. was announced in these columns last week.

CHARLES E. HAMMOND, who as announced in these columns last week, has been made assistant to the president of the A. F. Holden Co.

OBITUARY...

• **George L. Markland, Jr.**, chairman of the board of the Philadelphia Gear Works, Philadelphia, died in Jefferson Hospital in that city after a long illness on Aug. 14. He was 73 years old. He was a former president of the American Gear Manufacturers' Association, a former director of the National Association of Manufacturers and the National Metal Trades Association.



THE LATE George L. Markland, Jr., chairman of the board of Philadelphia Gear Works.

• **George Robertson**, engineer for the Falk Corp., Milwaukee, for 27 years, died Aug. 13 at his home in Wauwatosa, Wis. Mr. Robertson was born in Scotland and went to Milwaukee in 1910.

• **Ephraim Honeyman**, estimator in the conveyor engineering division of Chain Belt Co., Milwaukee, for 19 years, until his retirement in 1939, was killed recently in an automobile accident. He was a native of Sterlingshore, Scotland.

• **Lenus S. Kerchner**, aged 61 years, died Aug. 15 at his home in Pittsburgh. He was connected with the American Manganese Mfg. Co., now the Dunbar Corp., for many years. In 1920 he formed the Sales Agency for Pig Iron, Coke & Sand and in 1922 formed, with R. M. Marshall, a partnership known as Kerchner & Marshall, incorporated in 1928 as Kerchner, Marshall & Co.

CONSTRUCTION STEEL

. . . STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Awards decline to 10,300 tons from 23,235 tons last week; new projects drop to 24,855 tons from 38,125 tons; plate lettings only 306 tons.

AWARDS

NORTH ATLANTIC STATES

1600 Tons, Presque Isle-Houlton, Me., government hangars, to Bethlehem Steel Co., Bethlehem, Pa., and Belmont Iron Works, Philadelphia.

180 Tons, Lyme, Conn., bridge No. 35.11 over Lieutenant River for New York, New Haven & Hartford Railroad Co., to American Bridge Co., Pittsburgh.

110 Tons, New York, Lehigh Valley freight shed, East 47th Street and East River, to Schacht Steel Construction Co., New York.

200 Tons, Lansdowne, Pa., Bell Telephone building, to Bethlehem Steel Co., Bethlehem, Pa.

THE SOUTH

2085 Tons, Avon, Ky., buildings for U. S. Engineers, to International Steel Co., Evansville, Ind.

250 Tons, Dallas, Tex., building, Standard Brands, Inc., to Mosher Steel Co., Dallas.

220 Tons, Laurel, Miss., grading building for Masonite Corp., to Ingalls Iron Works Co., Birmingham.

CENTRAL STATES

2500 Tons, Minneapolis, Minn., addition to power house for Northern States Power Co., to Minneapolis-Moline Power Implement Co., Minneapolis, and St. Paul Foundry Co., St. Paul, Minn.

610 Tons, Dayton, Ohio, Wright Field Air Corps building, to Indiana Bridge Co., Muncie, Ind.

350 Tons, Menominee, Ill., bridge No. W-172-SN and W-172-2SO, for Illinois Central System, to American Bridge Co., Pittsburgh.

280 Tons, Wichita, Kan., Beech Aircraft Corp. plant, to George C. Christopher & Son, Wichita, Kan.

212 Tons, Daysville, Ill., State highway bridge, to Clinton Bridge Works, Clinton, Iowa.

125 Tons, Milltown or Paoli, Ind., State bridge, contract No. 2188, to American Bridge Co., Pittsburgh.

WESTERN STATES

1000 Tons, Oakland, Cal., Navy provision storage buildings, to Columbia Steel Co., San Francisco, through Dinwiddie Construction Co., San Francisco, contractor.

700 Tons, Phoenix, Ariz., Goodyear Aircraft Corp. airplane parts plant, to Muskogee Iron Works, Muskogee, Okla.

103 Tons, Norwood, Colo., San Miguel River bridge on State Highway 145, to Kansas City Structural Steel Co., Kansas City, Kan., through Frank M. Kenney, Denver, contractor.

BERMUDA

457 Tons, aircraft utility shop for United States government, to Ingalls Iron Works Co., Pittsburgh plant.

PACIFIC OCEAN

268 Tons, Midway Islands, aircraft assembly shop for United States government, to Ingalls Iron Works Co., Pittsburgh plant.

PENDING STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

7100 Tons, Brooklyn, sub-assembly shop, Navy yard, Bethlehem Steel Co., Bethlehem, Pa., low bidder; Contractors for Drydocks, New York, contractors.

1800 Tons, Baltimore, tube mill for Revere Copper & Brass Co.

1039 Tons, Wildwood, N. J., bridge over Grassy Sound, State highway route S-49, section 5; bids Sept. 5.

1000 Tons, Philadelphia Navy Yard, lift bridge; bids Sept. 10.

950 Tons, South Philadelphia, pier shed for Pennsylvania Railroad.

600 Tons, Rome, N. Y., engine repair building and engine test building, Air Corps Depot; Turner Construction Co., New York, and Louis Mayersohn, Rome, N. Y., contractors.

315 Tons, Bradford County, Pa., highway project; bids Aug. 29.

310 Tons, Pittsfield, Mass., extension to building No. 33 for General Electric Co.

250 Tons, Hyattsville, Md., dial center for Chesapeake & Potomac Telephone Co.

130 Tons, Hamden, Conn., plant addition for High Standard Mfg. Co.

125 Tons, Portland, Me., beams for crane runways for South Portland Shipbuilding Co.

150 Tons, Tonawanda Township, N. Y., plant additions for Lake Erie Engineering Corp.

THE SOUTH

700 Tons, Apalachia Tuunel supports for TVA.

170 Tons, Norfolk, Va., recreation building, Naval operating base.

160 Tons, Weirton, W. Va., exhauster and booster building for Weirton Steel Co.

CENTRAL STATES

5000 Tons, Dearborn, Mich., Rouge plant foundry building for Ford Motor Co.

2700 **Tons,** Milwaukee, factory buildings Nos. 114, 115 and 70 for A. O. Smith Corp.
2400 **Tons,** Chicago, subway connections, 13th Street, W. Willow Street & Hermitage Avenue.
1950 **Tons,** various locations, 1942 bridge requirements for Chicago, Rock Island & Pacific Railroad Co.
610 **Tons,** Fort Crook, Neb., paint shop, aircraft manufacturing and assembly plant, for U. S. Engineers office.
575 **Tons,** Louisiana, Mo., compressor houses and cracking furnace units, for Hercules Powder Co.
190 **Tons,** Pierre, S. D., State highway bridge.

WESTERN STATES

3000 **Tons,** Garfield, Utah, power house for Utah Copper Co.
300 **Tons,** Oakland, Cal., transit shed for Naval supply depot.
278 **Tons,** Yakutat, Alaska, hangar; bids to United States Engineer, Seattle.
150 **Tons,** Santa Maria-Lompoc, Cal., armored division cantonment.

FABRICATED PLATES

AWARDS

305 **Tons,** Redding, Cal., Bureau of Reclamation water and oil tanks (Specification 973), to Chicago Bridge & Iron Co., San Francisco. Tonnage includes shapes.

PENDING PROJECTS

400 **Tons,** Philadelphia, 48-in. steel pipe for watermain; bids Sept. 5.

SHEET PILING

AWARDS

130 **Tons,** East Chicago, Ind., Standard Oil Co. of Indiana tunnel job, to Joseph T. Ryerson & Son, Inc., Chicago.

Reinforcing Steel

Awards of 27,700 tons; 8400 tons in new projects.

AWARDS

ATLANTIC STATES

600 **Tons,** Hingham, Mass., ammunition dump, bars and mesh: bars to Bethlehem Steel Co., Bethlehem, Pa.; mesh to Concrete Steel Co., Boston.
500 **Tons,** Erie, Pa., General Electric Co. turbine manufacturing plant, divided between Jones & Laughlin Steel Corp., Pittsburgh, and Buffalo Steel Co., Buffalo; United Contractors & Constructors, contractors.
300 **Tons,** Lynn, Mass., General Electric gear manufacturing plant, to Bethlehem Steel Co., Bethlehem, Pa.
250 **Tons,** Dorchester, Mass., warehouse, General Foods, Inc., to Bethlehem Steel Co., Bethlehem, Pa.; Nicholson Co., contractor.

THE SOUTH

2000 **Tons,** Oklahoma City, Army air base, to Sheffield Steel Corp., Kansas City, Mo.
1200 **Tons,** Marche, Ark., Army picric acid plant, to Laclede Steel Co., St. Louis; Cities Service Defense Corp., contractor.
300 **Tons,** Henderson, Ky., Atmospheric Nitrogen Corp. ammonia plant, to Truscon Steel Co., Youngstown.

CENTRAL STATES

1700 **Tons,** Jeffersonville, Ind., flood wall for U. S. Engineer, to Laclede Steel Co., St. Louis.
600 **Tons,** Minneapolis, Minn., grain elevator, to Laclede Steel Co., St. Louis, through Jones-Hettelsater, contractors.
360 **Tons,** Dearborn, Mich., Ford Motor Co. connecting tunnels, to Concrete Steel Fireproofing Co.: Esslinger-Misch Co., contractor.
350 **Tons,** Detroit, Mich., sewage plant for Ford bomber plant, to Truscon Steel Co., Youngstown.
329 **Tons,** East Chicago, Ind., Standard Oil Co. of Indiana, shaft connecting tunnel, to Joseph T. Ryerson & Son, Inc., Chicago.
300 **Tons,** Whiting, Ind., Standard Oil Co. connecting tunnels, to Joseph T. Ryerson & Son, Inc., Chicago.

WESTERN STATES

3000 **Tons,** Salt Lake City, Utah, small arms plant, to Colorado Fuel & Iron Co., Denver; Broderick & Gordon, contractor.
166 **Tons,** Mancos, Colo., Bureau of Reclamation invitation 17007-A-2, to Sheffield Steel Corp., Kansas City, Mo.

FOREIGN

15,750 **Tons,** British requirements, allocated among 12 United States steel makers.

Weekly Bookings of Construction Steel

Week Ended →	Aug. 26, 1941	Aug. 19, 1941	July 29, 1941	Aug. 27, 1940	Year to Date 1941	Year to Date 1940
Fabricated structural steel awards	10,300	23,235	14,200	21,600	944,445	618,025
Fabricated plate awards	305	1,300	1,250	1,245	96,070	109,800
Steel sheet piling awards	130	0	2,340	0	20,760	30,940
Reinforcing bar awards	27,700	15,590	22,500	13,965	438,295	311,615
Total Letting of Construction Steel	34,435	40,125	40,290	36,810	1,499,570	1,070,380

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

4000 **Tons,** Washington, PWA central heating plant.
3000 **Tons,** Queens, N. Y., Laurelton sewer; Andrew Catapana, Brooklyn, contractor.
700 **Tons,** Washington, S. E. Kramer Junior High School.

590 **Tons,** New York, Manhattan tunnels, contract No. 6.
500 **Tons,** Chicago, Francis Cabrini Homes; bids Sept. 9.
287 **Tons,** Wildwood, N. J., bridge over Grassy Sound, State highway route S-49, section 5; bids Sept. 5.
350 **Tons,** Catskill, N. Y., North American Cement Co. expansion; Nicholson Co., contractor.
200 **Tons,** Baltimore, Revere Copper & Brass Co. tube mill; James Stewart Co., contractor.
200 **Tons,** Lincoln, R. I., mesh, Louisquisset Pike bridge.
150 **Tons,** Brookline, Mass., municipal court house.
100 **Tons,** Wyman Crossing, Me., pass under Maine Central Railroad tracks.
100 **Tons,** Winchendon, Mass., dike. Kiewit, Paschen & Condon, contractors.

SOUTH AND CENTRAL

7000 **Tons,** Parsons, Kan., shell loading plant; Kiewit, Paschen & Condon, contractor.
4000 **Tons,** Momence, Ill., War Department ordnance storage; Henry Erickson Co., contractor.
600 **Tons,** North Chicago, Ill., Abbott laboratories.
500 **Tons,** Detroit, small arms plant, Lyons, Inc.
300 **Tons,** Plymouth, Mich., Burroughs Adding Machine Co. plant.
200 **Tons,** Kosmosdale, Ky., railroad overhead crossing.
120 **Tons,** Rock Island, Ill., Department of Waterways, seawall for State.
120 **Tons,** Centralia, Ill., Raccoon Creek reservoir.

WESTERN STATES

989 **Tons,** Los Angeles, Rancho San Pedro housing project; bids in.
285 **Tons,** Nicolaus, Cal., repair Feather River bridge; rebid Sept. 3.
100 **Tons,** Long Beach, Cal., Desmond's store.

ALASKA

200 **Tons,** Yakutat, hangar; bids to United States Engineer, Seattle.
125 **Tons,** Anchorage, Alaska Railway depot and office building; J. B. Warrick, Seattle, contractor.

Cast Iron Pipe

● **Bridgeport Hydraulic Co.,** 836 Main Street, Bridgeport, Conn., has approved plans for approximately 1000 ft. of 6-in. pipe for Fairfield, Conn., water extensions.

War Department, Constructing Quartermaster, Harbor Defenses of Boston, Army Base, will take bids until Aug. 29 on 6800 ft. of 10-in. pipe.

Pasadena, Tex., plans pipe line extensions and replacements in water system and other waterworks installation. Fund of about $532,700 is being arranged through Federal aid for this and expansion in sewage system. Garrett Engineering Co., 3504 Audubon Street, Houston, Tex., is consulting engineer.

Corpus Christi, Tex., plans extension and replacements in water pipe lines and other waterworks installation, including new 1,000,000-gal. storage reservoir, pumping machinery and auxiliary equipment. Fund of about $2,294,200 is being arranged through Federal aid for project. Myers & Noyes, Tower Petroleum Building, Dallas, Tex., are consulting engineers.

Waynesfield, Ohio, plans pipe lines for water system and other waterworks installation, including new 75,000-gal. elevated steel tank and tower. Ellis & Wertz, 122½ East Main Street, Van Wert, Ohio, are consulting engineers.

Board of Commissioners, Wapello County, Ottumwa, Iowa, asks bids until Sept. 4 for 15,000 ft. of 6-in. pipe for new water line from city to county farm. J. Edward Love is county auditor.

Omak, Wash., plans 12-in. pipe for main line from new well near south boundary of city to Fifth Avenue South, across Okanogan Railroad line, for connection with existing trunk main, and other extensions in pipe line. Also construction of new pumping station at water source, with installation of three motor-driven pumping units and auxiliary equipment, with rating of 3000 gal. per min.; a fourth pump will be installed later. Cost about $60,000.

Pipe Lines

● **Anderson-Prichard Oil Corp.,** Ramsey Tower Building, Oklahoma City, has approved plans for 6-in. welded steel pipe line from oil field district at Cement, Caddo County, Okla., to Cyril, same county, about seven miles, for crude oil transmission to company refinery at latter place. Work will be carried out by company forces. Company also has acquired former pipe line system of Magnolia Petroleum Co., from oil field noted to point in southern part of State, about 45 miles, and will recondition and improve for early service. Extension will be made from present terminus for connection with company pipe line system. Existing pipe line gathering system in Cement oil field will be extended and improved.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 4 for steel pipe; also for steel tubing and wrought iron pipe, all for Eastern and Western Navy yards (Schedule 8403).

Dow Chemical Co., Freeport, Tex., plans new main welded steel pipe line with laterals from natural gas field, approximately 100 miles, to site of new synthetic ammonia plant for government production at Clute, suburb of Freeport, for natural gas transmission for processing service at plant. Also will build booster stations and other operating facilities, including terminal and control station at plant site. Cost over $750,000, exclusive of plant investment, which is estimated at $11,000,000, to be furnished by government through Defense Plant Corp., Washington. Main offices of company are at Midland, Mich.

Army Takes Over Tank Production

Washington

• • • **Transfer of the OPM** tank unit to the Army's ordnance department and relinquishment of OPM supervisory power over tank construction places the problem of tank design and construction back in the Army's lap, right where it was before the inception of the OPM and its predecessor, the NDAC.

While the transfer is publicized by OPM as "the best means" of expediting the $1,000,000,000 tank program just ahead, reliable reports were that the shift was forced by internal conflicts in OPM's tank division and by personal rows with the Army.

The change brings the OPM tank unit, headed by W. W. Knight, Jr., former president of the Ford Building Co., in Detroit, under the wing of the Ordnance Department's newly-created tank and combat vehicle division. The tank unit, which from now on will be concerned particularly with arranging for additional facilities to handle the increase expanding tank program, was formerly in OPM's ordnance branch under E. F. Johnson, retired General Motors vice president.

Reinforcing Steel Group To Meet Sept. 19 and 20

• • • **The Concrete Reinforcing Steel** Institute will hold its 17th semi-annual meeting at the Broadmoor hotel, Colorado Springs, Col., Sept. 19 and 20, Ralph F. Healy, president of the institute, has announced. C. A. Menzel, research engineer of the Portland Cement Association, will speak on "The Proposed Standard Deformed Bar."

Smaller License Plates

Detroit

• • • **Savings of about** 1000 tons of steel in the manufacture of Michigan's 1942 license plates is expected through redesigning. The new plates will be a trifle smaller than the 1941 plates but are being made heavier in anticipation of two years of use, instead of the normal one year.

Fewer Lake Vessels Now Carrying Scrap

Cleveland

• • • **The number of scrap** carrying vessels on the Great Lakes has undergone a sharp decline recently, principally due to lack of scrap tonnages. A group of these ships has been taken over by the government for service in other waters and one or two individual ships have been assigned by their owners to service elsewhere. In recent months operators of scrap vessels have been forced to accept numerous cargoes other than scrap in order to insure adequate operations.

Meanwhile the American Great Lakes ore vessel fleet of 292 boats continues with 100 per cent of its tonnage in commission, unchanged from the rate prevailing in July. So far this season there have been 13 Canadian boats loading American ore for American ports.

Manganese Differential in Pig Iron Order Confusing

Philadelphia

• • • **There has been considerable** confusion in the pig iron trade in interpreting the OPACS differential on manganese. The order states that an additional charge not to exceed 50c. a ton may be made for each 0.50 per cent manganese content above 1 per cent.

In such cases where the manganese slightly exceeds 1 per cent, some furnaces are charging the entire 50c. differential as permitted by the order, while other producers are charging 25c. a ton above the base price for analyses ranging from 1.01 to 1.25 per cent manganese and the total 50c. differential for iron with manganese between 1.26 and 1.50 per cent.

Others have charged the customer for exactly what he is receiving. If the iron should analyze 1.01 per cent manganese, the customer is charged 1c. a ton above the base price, or if it should analyze 1.15 per cent manganese, 15c. a ton would be added to the base price.

Official clarification of this part of the Pig Iron Price Schedule would be welcomed by both the pig iron producing and consuming trade.

Many Foundries Seen in Precarious Position

• • • **Beset on one side** by a shortage of cast scrap and on the other by strict priorities which are expected to shut off iron supplies from plants not engaged in defense work, many foundries throughout the country were reported last week to be in a very precarious position by THE IRON AGE correspondents.

Buffalo reported that pig iron stocks were practically non-existent and continued operation of many plants hinges upon the speed with which OPM acts on the September allocations.

A number of Chicago foundries will have to close down if iron is not available before Sept. 10 or 15. The average stock pile there is not expected to last beyond those dates. Many plants there feel that OPM will not be able to get releases back to the producers by Sept. 1 as the priority order promises. Chicago producers are also confused by the type of analysis which they must hold over for the September pool.

The problem in New England is what decision the government will make on plants only partially engaged on defense work. While many foundries there are still working on some civilian orders, practically every plant there has some defense output. Producers are being delayed in making their reports to Washington by slowness with which many foundries are returning PD-69.

The prospect that the Hamilton, Ohio, furnaces of American Rolling Mill Co. may be forced to resume shipment of merchant iron is seen likely due to the working of the OPM priority order. For some time these furnaces have been confined to the production of steel making iron for the company's Middletown and Butler plants. Old merchant customers have been supplied by outside purchases to cover their contracts, but this procedure may not be permitted in the future.

Scout Car Makers Pool Purchasing

• • • **White Motor Co.** has joined with two competitors, the Diamond T Co. and the Autocar Co., in a cooperative purchasing endeavor. All three companies are engaged in making scout cars.

MACHINE TOOLS

. . . SALES, INQUIRIES AND MARKET NEWS

Revised Critical List Seen As New Bottlenecks Appear

Chicago

• • • **Machine tool manufacturers** will not be surprised if the "critical list" is changed by the middle of September. A number of reasons are contributing to a switch in parts which are becoming more "critical." As these columns reported several weeks ago, such parts as gears and electrical equipment show signs of holding up the production parade. Then, sub-contractors are presenting a not unexpected hitch. Certain key parts are not getting the precision built into them by outsiders which the builder expects. This is resulting in a shifting of certain production schedules and set-ups.

A Wisconsin machine tool maker has told THE IRON AGE that he expects the machine tool boom to last four to six years—perhaps longer. He contends that the combination of changing tooling from a wartime basis to a peacetime footing, plus the sharp reduction in machine life caused by around-the-clock operation, will give the industry the biggest replacement program it has ever known. He

Machine Tool Shipments Show Decline in July

Cleveland

• • • **Shipments of machine tools in July showed a slight decline from the June level, according to the Machine Tool Builders' Association. The association put the value of July shipments at $57,900,000, as compared with $63,000,000 in the preceding month. Shipments in May of this year amounted to $60,800,000 and in July, 1940, were estimated at $31,500,000.**

Tank Program Enlarged

Cleveland

• • • **The enlarged program** for Army tank production will require about $12,000,000 in additional machine tools, according to a reliable estimate here. This development is one of the newest and largest factors in the current machine tool picture. Meanwhile purchasing for the bomber plane program is going forward steadily.

Surprisingly, some machine tool makers are heading into a period of light production due to the uneven demands of the defense program and also because of the proposed curtailment of certain consumer goods like automobiles. These machinery companies eventually will turn their productive facilities into new channels.

The local market is more active. Bishop & Babcock has obtained a large shell order. Yoder Co. also has received a shell order. Thompson Products is planning another addition. Cleveland Pneumatic Tool has another expansion on the boards. Several other large contracts have been announced here recently.

Output Has Been Tripled

Cincinnati

• • • **Estimates of capacity increase** through building programs in this area fluctuate around the 300 per cent mark. Of course, the broadening of physical space, it is pointed out, is not the sole factor in increased output, since of course, manpower also is vital. Taking into account the broadening of hours and the increase of available labor, the general feeling is that machine tool output in this area is now three times greater than before the building programs began. While of course builders are catching up in some instances with backlogs, the steady inflow of new business has not yet made the delivery picture any more optimistic than it was several months ago.

NON-FERROUS METALS

. . . MARKET ACTIVITIES AND PRICE TRENDS

Brass Priorities Ceiling Expected

• • • **Following a three week** barrage of official orders, price ceilings, and requests from Washington, the non-ferrous industry has lapsed into a comparative lull, and there has been a "back to company business" attitude during the past several days.

Trade interest in copper this week was centered on the outcome of Tuesday's meeting in Washington at which the application of priorities on brass ingots and brass scrap were to be discussed. It is understood that OPACS is completing a price schedule, to be issued soon, on these commodities.

OPM this week asked all large suppliers of copper to file daily reports with the U. S. Copper Association, showing the amount of red metal available for August delivery, the tonnage called for by endorsed certificate holders, and stocks remaining available for other holders of certificates. With regard to the basing points on Lake and casting copper, OPACS has taken no action as yet. The latest word on this matter is that producers are to sell on the 12c., Valley basis, but they need not sell at 12.125c., mid-west points.

Arizona copper mines, now operating two eight hr. shifts a day, are considering going on three eight hr. shifts a day and on a seven day week instead of the present six day work week schedule. This, however, would increase production only 20 per cent, whereas labor costs would go up about 33 per cent, and a 14c. price would be necessary to offset added costs.

The official order fixing the metallic zinc pool for September at 27 per cent of July Production was issued by OP Mon Friday. Also, an amount equal to 10 per cent of the July zinc oxide production is required for the pool, but there was no pool established for zinc dust. Producers are greatly relieved that no increase in the pool was deemed necessary at this time.

Tin for September delivery is very scarce as most sellers have disposed of what little stocks they had, and demands for prompt and September delivery, while not large, are in excess of available supplies. It is hoped that Metals Reserve Co. will release some limited quantities of tin from their stock piles during the next six weeks.

Consolidated Mining & Smelting Co. has developed a process for recovering small amounts of tin contained in the complex silver-lead-zinc ore from its Sullivan Mine at Kimberley, British Columbia. Potential production from this source is expected to be at least 10 per cent of Canadian consumption.

Lead requirements for August are believed to have been completely taken care of and about 30 per cent of lead consumers' September needs have been scheduled. While the August allocation of 27,000 tons of Metals Reserve Co. lead is completed, it will be several weeks before all deliveries can be made. Demand for lead continues very strong, indicating that consumers are still concerned about possible distribution controls.

OPACS Administrator Henderson said last week that $192 a flask for quicksilver "is completely out of line and there is no reason for any buyer to pay present prices." Anyone compelled to pay this high price for mercury requirements is urged to notify OPACS, giving details of such purchases.

Non-Ferrous Prices

(Cents per lb. for early delivery)

Copper, Electrolytic[1]	12.00
Copper, Lake	12.00
Tin, Straits, New York	52.00
Zinc, East St. Louis[2]	7.25
Lead, St. Louis[3]	5.70

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

SCRAP

. . . MARKET ACTIVITIES AND PRICE TRENDS

Scrap Priorities Expected Shortly

• • • **Prospects of priorities** for scrap, or at least the creation of a government pool to handle emergency requirements, as a means to correct the present chaotic conditions in the scrap iron and steel market grew more likely this week as the market continued to operate with little, if any, regard for the OPACS regulation. OPACS grade standards have all but disappeared and scrap sales on the basis of the agency's maximums have become a rarity, as previously reported here.

While the nature of the steps to develop from yesterday's meeting at Washington are still indefinite, it is probable that some form of direct control over supplies plus some revisions (which at the moment are believed will be minor) in the price schedules affecting freight rates, will be made. The proposal that brokers be licensed apparently has support only among members of OPACS, as little, if any, benefit can be seen as arising from such a step.

One certainty, however, does face scrap buyers throughout the country—that is that prices in the future will be higher than the OPACS schedule.

The scrap trade had little new to suggest to Washington. The tendency of OPACS in the past to ignore the trade's suggestions has acted to dampen their enthusiasm. There is noticeable, however, a growing opinion among both the trade and scrap consumers that the only solution to the scrap problem, which will directly affect a tonnage large enough to correct the present deficit is higher prices.

These higher prices will enable mills to tap distant sources and draw in "high cost" supplies as has been done in the past in times of heavy demand. OPM and OPACS have experimented with various methods of increasing the scrap supply over the past months, but it becomes apparent now that the amount of material which can be obtained from these efforts is not sufficient to correct the present shortage.

Experience with community drives to date has indicated that while they may provide temporary relief, they cannot bring out the large tonnages needed in a steady volume. Auto wrecking and reclamation of abandoned railroad scrap are only temporary measures.

The charge that the talk of higher prices is the result of an effort by the scrap trade to capitalize on the shortage has no foundation in fact, particularly since leading brokers are emphatic in recommending that no change be made in the current brokers' fee of 50c. a ton.

Pittsburgh reports that the maximums for that area have been exceeded by as much as $4 to $6 a ton and that the higher prices have acted to stimulate the flow of scrap from the Southwest which was lacking when only OPACS prices were being paid. Reports are also current that some cast grades have brought as high as $29 recently. Another source of friction are special concessions granted by OPACS to a few mills, while turning down similar requests from other mills.

OPM-OPACS Hold Joint Scrap Meeting

Washington

• • • **That the acute** shortage of iron and steel supplies is a source of growing concern is evidenced from an OPM-OPACS joint meeting with about 150 iron and steel scrap brokers and representatives of steel and foundry interests scheduled for Wednesday for the purpose of devising means of in-

creasing supplies. An announcement said that OPM Director General William S. Knudsen and OPACS Leon Henderson would preside and that Army and Navy representatives will also be present.

•

Pittsburgh—The scrap price setup, as contained in the OPACS iron and steel scrap order, has collapsed here. Instances have been reported where as high as $25 has been paid for heavy melting steel in the Pittsburgh district and there has been even questions as to what kind of heavy melting steel was shipped on the order. Other scrap grades have also been sold for prices exceeding the ceiling limits by as much as $4 to $6 a ton. Brokers and dealers who have adhered to official OPACS prices have been anxiously twiddling their thumbs and to all practical purposes have gone out of business. It is noted that the higher prices offered here within the past week caused a flow of scrap from the Southwest which was unobtainable at the official ceiling quotations.

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Youngstown—With supply sources broadened and more odd lots being handled, the movement of heavy melting to this district appears slightly improved. However, it is still below consumption in the case of some of the principal steel mills. One buyer for several plants estimates shipments are about 15 per cent below consumption.

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Chicago—Leading scrap brokers in this district quit the market cold last weekend and may not come back until Thursday or Friday of this week, depending upon the outcome of the Washington meeting of both scrap and steel mill interests. Unable to buy scrap except at prices above the ceiling, and with mills refusing to go above pegged prices, purchases have stopped until the situation clears.

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Detroit—The scrap industry here is looking forward to possible announcement of a system of scrap priorities, probably accompanied by a system of licensing of brokers. In some quarters this possibility is viewed with a lot of favor because it seems to take care of problems of supplies, price and up-grading all at once. It will remove the extreme competition of mills for materials and possibly because of that will increase the apparent supply of scrap. If up-grading can be eliminated it will also lessen the competitive strife. Rumors that meetings in Washington would result in a system of voluntary pledges were not regarded favorably here.

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Birmingham—Cast scrap is reported unavailable here and there is little, if any, No. 2 heavy melting steel. Movement of foundry steel into this market is holding its own although supplies have been considerably below normal for weeks.

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St. Louis—Aggravated by strict pig iron control, foundries here are hard pressed to obtain sufficient cast scrap to maintain current operations. Stocks of all kinds of scrap in commercial yards are the smallest on record. Collection of country scrap has fallen sharply, owing mainly to scarcity of labor and preoccupation of farmers with harvests. Thus, far no mills have been obliged to curtail operations because of scrap shortage.

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Cincinnati—Dealers indicate an easing in buyer desperation and a rise of an attitude of resignation on the part of consumers generally. With the rounding out of priority on their old products, and the prospect of priorities on scrap, users generally have seemed to take an attitude that it is no use to scramble for a heavy supply, because if priorities do go in, the Government is liable to take away part of it anyway. Foundry scrap situation continues to be tense, but there is still a feeling that no curtailment is due for another thirty days, which now places this "desperate situation" thirty days beyond the original estimates.

(Scrap Prices on Next Page)

Iron and Steel Scrap (other than railroad scrap)

(Maximum basing point prices, as revised by OPACS to Aug. 8, 1941, from which shipping point prices and consumers' delivered prices are to be computed, per gross ton)

Basing Points → / ▼ GRADES	Pittsburgh	Johnstown Weirton Steubenville Youngstown Warren Sharon Canton	Chicago	Kokomo	Bethlehem	Claymont Coatesville Phoenixville Harrisburg	Sparrows Point	Buffalo	Cleveland	Toledo	Portsmouth Middletown Ashland	St. Louis	Detroit	Duluth Minneapolis*	Birmingham	Chattanooga	Radford, Va.	Worcester Bridgeport Phillipsdale, R. I.	Los Angeles San Francisco Seattle Portland	Minneapolis, Cole.
No. 1 heavy melting	$20.00	$20.00	$18.75	$18.25	$18.25	$18.75	$18.75	$19.25	$19.50	.....	$19.50	$17.50	$17.85	$18.00	$17.00	.....	.....	.....	14.50	16.50
No. 1 hyd. comp. black sheet	20.00	20.00	18.75	18.25	18.25	18.75	18.75	19.25	19.50	.....	19.50	17.50	17.85	18.00	17.00	.....	.....	.....	14.50	16.50
No. 2 heavy melting	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.25	18.50	.....	18.50	16.50	16.85	17.00	16.00	.....	.....	(See	13.50	15.50
Dealers' No. 1 bundles	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.25	18.50	.....	18.50	16.50	16.85	17.00	16.00	.....	.....	foot-	13.50	15.50
Dealers' No. 2 bundles	18.00	18.00	16.75	16.25	16.25	16.75	16.75	17.25	17.50	.....	17.50	15.50	15.85	16.00	15.00	.....	.....	notes)	12.50	14.50
Mixed borings and turnings	15.25	15.25	14.00	14.25	13.50	14.00	14.00	14.50	14.75	13.10	14.75	12.75	13.10	.....	12.25	.....	.....	.....	9.75	11.75
Machine shop turnings	15.50	15.50	14.25	14.50	13.75	14.25	14.25	14.75	15.00	13.35	15.00	13.00	13.35	15.50	15.00	Alloy, ...	W.Va. 17.60	.....	10.00	12.00
Shoveling turnings	16.50	16.50	15.25	15.50	14.75	15.25	15.25	15.75	16.00	14.35	16.00	14.00	14.35	16.50	.....	.....	.....	.....	11.00	13.00
No. 1 busheling	19.50	19.50	18.25	17.75	17.75	18.25	18.25	18.75	19.00	.....	19.00	17.00	17.35	17.50	16.00	.....	.....	.....	14.00	16.00
No. 2 busheling	15.50	15.50	14.25	13.75	13.75	14.25	14.25	14.75	15.00	.....	15.00	13.00	13.35	13.50	12.50	.....	.....	.....	10.00	12.00
Cast iron borings	15.75	15.75	14.50	14.00	14.00	14.50	14.50	15.00	15.25	13.60	[6]15.25	13.25	13.60	13.75	12.75	.....	.....	.....	10.25	12.25
Uncut structural, plate scrap	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.25	18.50	.....	18.50	18.50	16.85	17.00	16.00	.....	.....	.....	13.50	15.50
No. 1 cupola	21.00	21.00	20.00	20.00	22.50	23.00	22.00	20.00	22.00	.....	21.00	20.00	20.35	*19.00	20.00	20.50	21.00	22.00	18.00	.....
Heavy breakable cast	19.50	19.50	18.50	18.50	21.00	21.50	21.00	18.50	20.50	.....	19.50	18.50	18.85	*17.50	18.50	.....	.....	20.50	17.00	.....
Stove plate	19.00	[5]19.00	17.00	16.00	18.00	18.50	18.00	19.00	18.00	15.60	17.50	17.00	14.10	*16.00	17.00	17.50	18.00	17.50	14.00	.....
Low phos. billet, bloom crops	25.00	25.00	23.75	23.75	23.25	23.75	23.75	24.25	24.50	.....	23.50	22.50	22.85	23.00	22.00	.....	.....	.....	19.50	.....
Low phos. bar crops, smaller	23.00	23.00	21.75	21.75	21.25	21.75	21.75	22.25	22.50	.....	21.50	20.50	20.85	21.00	20.00	.....	.....	.....	19.50	.....
Low phos. pu'ch'gs., plate scrap[1]	24.75	23.00	21.75	21.75	21.25	21.75	21.75	22.25	22.50	.....	21.50	20.50	20.85	21.00	20.00	.....	.....	.....	17.50	.....
Machinery cast, cupola size[2]	22.00	22.00	21.00	21.00	23.50	24.00	23.50	21.00	23.00	.....	22.00	21.00	21.35	*20.00	21.00	21.50	22.00	23.00	19.00	.....
No. 1 mach. cast, drop-broken, 150 lb. and under	22.50	22.50	21.50	21.50	24.00	24.50	24.00	21.50	23.50	.....	22.50	21.50	21.85	20.50	21.50	22.00	22.50	23.50	19.50	.....
Clean auto cast	22.50	22.50	21.50	21.50	24.00	24.50	24.00	21.50	23.50	.....	22.50	21.50	21.85	20.50	21.50	22.00	22.50	23.50	19.50	.....
Punchings and plate scrap[3]	23.75	22.00	20.75	20.75	20.25	20.75	20.75	21.25	21.50	.....	20.50	19.50	19.85	20.00	19.00	.....	.....	.....	16.50	.....
Punchings and plate scrap[4]	22.75	21.00	19.75	19.75	19.25	19.75	19.75	20.25	20.50	.....	19.50	18.50	18.85	19.00	18.00	.....	.....	.....	15.50	.....
Heavy axle, forge turnings	21.25	19.50	18.25	18.25	17.75	18.25	18.25	18.75	19.00	.....	18.00	17.00	17.35	17.50	16.50	.....	.....	.....	14.00	.....
Medium h'vy. el. f'ce. turnings	19.75	18.00	16.75	16.75	16.25	16.75	16.75	17.25	17.50	.....	16.50	15.50	15.85	16.00	15.00	.....	.....	.....	12.50	.....

[1] This grade is ⅜-in. and heavier, cut 12 in. and under. [2] May include clean agricultural cast. [3] Under ⅜ to ¼-in., cut 12 in. and under. * Under ¼-in. to No. 12 gage, cut 12 in. and under. [5] Youngstown, Warren, Sharon and Canton are not basing points on this grade. [6] Middletown price for this grade is $15. * Minneapolis and St. Paul are basing points on following grades only: No. 1 cupola, heavy breakable cast, stove plate, machinery cast cupola size, No. 1 machinery cast drop broken, clean auto cast.

Railroad Scrap *(Per gross ton, delivered consumers' plants located on line of railroad originating scrap)*

Where the railroad originator of the scrap operates in two or more of the basing points named, the highest of the maximum prices established for such basing points shall be the maximum price of the scrap delivered to a consumer's plant at any point on the railroad's line, except that Chicago consumers of scrap originating from railroads operating in Chicago are permitted to pay as much as 84c. a gross ton in switching charges above the maxima.

Basing Points → / ▼ GRADES	Pittsburgh Sharon, Pa. Wheeling Steubenville Youngstown Canton	Chicago	Kokomo	Philadelphia	Wilmington	Sparrows Point	Cleveland	Buffalo	Portsmouth Middletown Ashland	St. Louis	Kansas City	Detroit	Duluth	Birmingham	Los Angeles San Francisco Seattle
No. 1 heavy melting	$21.00	$19.75	$19.25	$19.75	$19.75	$19.75	$20.50	$20.25	$20.50	$18.50	$17.00	$18.85	$19.00	$18.00	$15.50
Scrap rails	22.00	20.75	20.25	20.75	20.75	20.75	21.50	21.25	21.50	19.50	18.00	19.85	20.00	19.00	16.50
Rerolling rails*	23.50	22.25	21.75	22.25	22.25	22.25	23.00	22.75	23.00	21.00	19.50	21.35	21.50	20.50	18.00
Scrap rails 3 ft. and under	24.00	22.75	22.25	22.75	22.75	22.75	23.50	23.25	23.50	21.50	20.00	21.85	22.00	21.00	18.50
Scrap rails 2 ft. and under	24.25	23.00	22.50	23.00	23.00	23.00	23.75	23.50	23.75	21.75	20.25	22.10	22.25	21.25	18.75
Scrap rails 18 in. and under	24.50	23.25	22.75	23.25	23.25	23.25	24.00	23.75	24.00	22.00	20.50	22.35	22.50	21.50	19.00

* Relaying quality $5 higher.

Explanatory Notes

(A basing point includes its switching district.)

MAXIMUM PRICE at which any grade of scrap may be delivered to consumer's plant, wherever located, is the shipping point price, plus actual transportation from the shipping point to consumer. Where shipment is by water, actual handling charges at the dock of not more than 75c. a gross ton may be included as part of transportation charges. In no case may this maximum price exceed by more than $1 for prices (for material other than railroad scrap) for the basing point nearest the consumer.

COMPUTING SHIPPING POINT PRICE: A shipping point is the point from which the scrap is to be shipped to a consumer. The maximum price at which a grade of scrap may be sold f.o.b. its point of shipment is the shipping point price of such scrap. A shipping point price is computed as follows: (a) For Shipping Points located within a Basing Point.—The price established for the basing point in which the shipping point is located, is determined. Then deduct from this price the actual costs involved in transporting scrap from the shipping point to the consumer's plant within the basing point which is nearest, in terms of transportation costs, to the shipping point; (b) For Shipping Points located outside a Basing Point.—The price established for the nearest basing point, in terms of transportation charges, to the shipping point is determined. Then deduct from this price the lowest established charge for transporting scrap from the shipping point to such basing point. The figure thus obtained is the shipping point price. *Exceptions:* (1) The shipping point price at any shipping point in New England, of those grades of scrap for which no prices are listed above shall be the Johnstown basing point price as set forth above, minus the all-rail transportation costs from the New England shipping point to Johnstown. However, the shipping point price at any shipping point in New England of those grades of scrap for which prices are listed at the basing points in New England shall be computed from those New England basing point prices; and (2) Shipping point prices for any shipping point in New York City, Brooklyn, New York, and New Jersey, which, by reason of barge rates, are nearest in terms of transportation charges to the Buffalo basing point, shall not be computed from the Buffalo basing point, but shall be computed from the Bethlehem, Pa., basing point.

REMOTE SCRAP: Material located beyond the zone from which the railroad freight rate to Pittsburgh is $11.20 is called remote scrap. Consumers desiring to purchase such scrap, but unable to do so without exceeding the ceiling prices, may make application to OPACS for permission to absorb the excess freight charges.

UNPREPARED SCRAP: Regardless of source, maximum price of unprepared scrap is $2.50 less than maximum for corresponding grade of prepared scrap.

BILLET AND BLOOM CROPS: Where such material originates in the Pittsburgh basing point, it may be sold delivered to a consumer within or without the Pittsburgh point at the price given in Schedule 'A, plus not more than $2.50 in transportation charges. Lowest established transportation charges will govern.

Non-Ferrous Scrap

(Dealers buying prices, cents per lb.)

	New York	Philadelphia	Pittsburgh	Cleveland	Detroit	Chicago
No. 1 heavy copper	*10.00	*10.00	*10.00	*10.00	*10.00	*10.00
Light copper	* 8.00	* 8.00	* 8.00	* 8.00	* 8.00	* 8.00
Heavy yellow brass	6.50-6.75	**6.25	7.50-8.00	5.75-6.25	7.00-7.25	7.00-7.50
Light brass	5.75-6.00	**5.50	7.25-7.50	6.00-6.50	6.50-6.75	7.00-7.25
No. 1 comp. turnings	9.50-9.75	**7.75	**9.50-9.75	8.50-9.00	9.00-9.25	9.00-9.25
New yellow brass clips	8.00-8.25	8.50-9.00	7.75-8.00	8.00-8.50	7.50-8.00	7.75-8.25
Soft lead	5.25-5.50	5.00-5.25	4.75-5.00	4.75-5.00	5.00-5.25	4.75-5.00
Old zinc	4.00-4.25	4.25	4.25-4.50	4.00-4.25	4.50-4.75	4.50-5.00
Cast forged aluminum	*11.00	*11.00	*11.00	*11.00	*11.00	*11.00
Old sheet aluminum	*11.00	*11.00	*11.00	*11.00	*11.00	*11.00
Solder joints	8.75-9.00	9.00	7.50-8.00	6.50-6.75	5.50-6.00	7.50-8.00
No. 1 pewter	36.00-37.00	35.00-36.00	31.00-32.00	32.50-34.00	37.50-38.50	32.00-34.00

* OPACS maximum for sale by dealer. ** Nominal.

. . . Comparison of Prices

(Advances Over Past Week in **Heavy Type**; Declines in ***Italics***)

(Prices Are F.O.B. Major Basing Points)

	Aug. 26, 1941	Aug. 19, 1941	July 29, 1941	Aug. 27, 1940
Flat Rolled Steel:				
(Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.5¢	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate.				
(Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes:				
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wire and Wire Products:				
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails:				
(Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel:				
(Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp				
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

	Aug. 26, 1941	Aug. 19, 1941	July 29, 1941	Aug. 27, 1940
Pig Iron:				
(Per Gross Ton)				
No. 2, fdy., Philadelphia	$25.84	$25.84	$25.84	$24.84
No. 2, Valley furnace	24.00	24.00	24.00	23.00
No. 2, Southern Cin'ti	24.06	24.06	24.06	23.06
No. 2, Birmingham	20.38	20.38	20.38	19.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	23.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	24.34
Basic, Valley furnace	23.50	23.50	23.50	22.50
Malleable, Chicago†	24.00	24.00	24.00	23.00
Malleable, Valley	24.00	24.00	24.00	23.00
L. S. charcoal, Chicago	31.34	31.34	31.34	30.34
Ferromanganese‡	120.00	120.00	120.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap:				
(Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$18.75
Heavy melt'g steel, Phila.	18.75	18.75	18.75	20.00
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.50
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.25
Low phos. plate, Youngs'n	23.00	23.00	23.00	22.25
No. 1 cast, Pittsburgh	22.00	22.00	22.00	19.75
No. 1 cast, Philadelphia	24.00	24.00	24.00	22.25
No. 1 cast, Ch'go*	21.00	21.00	21.00	17.25

*Changed to gross ton basis, April 3, 1941.

Coke, Connellsville:				
(Per Net Ton at Oven)				
Furnace coke, prompt	$6.125	$6.125	$6.125	$4.75
Foundry coke, prompt	6.875	6.875	6.875	5.25
Non-Ferrous Metals:				
(Cents per Lb. to Large Buyers)				
Copper, electro., Conn.*	12.00	12.00	12.00	11.00
Copper, Lake, New York	12.00	12.00	12.00	11.00
Tin (Straits), New York	52.00	52.00	53.50	50.625
Zinc, East St. Louis	7.25	7.25	7.25	6.50
Lead, St. Louis	5.70	5.70	5.70	4.75
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 120-122 herein. On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in the detailed price tables.

. . . Composite Prices

FINISHED STEEL	PIG IRON	SCRAP STEEL
Aug. 26, 1941 ..... 2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago ..... 2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago ..... 2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago ..... 2.30467c. a Lb.	$22.61 a Gross Ton	$19.08 a Gross Ton

	High	Low	High	Low	High	Low
1941	2.30467c.,	2.30467c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99629c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

A weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip. These products represent 78 per cent of the United States output. This revised index recapitulated to 1929 in the Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Prices of Finished Iron and Steel...

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled [1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long ternes [2]	3.80¢		3.80¢									4.55¢			
STRIP															
Hot rolled [3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled [4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester =3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester =3.35¢)					3.05¢	3.31¢	
TIN PLATE Standard cokes, base box	$5.00	$5.00	$5.00						$5.10						$5.32
BLACK PLATE 29 gage [5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (10)			3.37¢
TERNES, M'FG. Special coated, base box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth =2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel [6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢	2.39¢	
Reinforcing (rail) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		2.47¢
Cold finished [8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit =2.70¢)					3.01¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massilon, Canton =2.70¢					2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES								(Coatesville and Claymont =2.10¢)							
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢ [11]		2.45¢	2.65¢	2.25¢	2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢			(Coatesville =3.50¢)						3.95¢	4.15¢		3.70¢	3.37¢
SHAPES Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem =2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester =3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester =4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester =6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester =8.55¢)								
WIRE [9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester =2.70¢)					3.10¢			2.92¢
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester =2.70¢)					3.10¢			2.92¢
Spring	3.20¢	3.20¢		3.20¢			(Worcester =3.30¢)					3.80¢			3.52¢
PILING Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢
IRON BARS Common		2.25¢			(Terre Haute, Ind. =2.15¢)										
Wrought single refined	4.40¢														
Wrought double refined	5.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lot to manufacturing trade. [10] Boxed. [11] Ship plates only.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2 higher; f.o.b. Duluth, billets only, $2 higher.

Per Gross Ton

Rerolling $34.00
Forging quality 40.00

Shell Steel

Basic open hearth shell steel, f.o.b. Pittsburgh and Chicago.

Per Gross Ton

3 in. to 12 in..... $52.00
12 in. to 18 in..... 54.00
18 in. and over..... 56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton

Open hearth or bessemer..... $34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved, universal and sheared 1.90c.

Wire Rods

(No. 5 to 9/32 in.) *Per Lb.*

Pittsburgh, Chicago, Cleveland 2.00c.
Worcester, Mass. ..... 2.10c.
Birmingham ..... 2.00c.
San Francisco ..... 2.50c.
Galveston ..... 2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

Alloy Steel Blooms, Billets and Slabs

Per Gross Ton

Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem $54.00

TOOL STEEL

(F.o.b. Pittsburgh)

Base per Lb.

High speed ..... 67c.
High-carbon-chromium ..... 43c.
Oil hardening ..... 24c.
Special carbon ..... 22c.
Extra carbon ..... 18c.
Regular carbon ..... 14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

PIG IRON

All prices set in bold face type are maxima established by OPACS on June 24, 1941. Other domestic prices are delivered quotations per gross ton computed on the basis of the official maxima.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorous	Charcoal	
Boston	$25.50	$25.00	$26.50	$26.00	.....	.....	
Brooklyn	27.50	.....	.....	28.00	.....	.....	
Jersey City	26.53	26.03	27.53	27.03	.....	.....	
Philadelphia	25.84	25.34	26.84	26.34	.....	.....	
Bethlehem, Pa.	**$25.00**	**$24.50**	**$26.00**	**$25.50**	.....	.....	
Everett, Mass.	**25.00**	**24.50**	**26.00**	**25.50**	.....	.....	
Swedeland, Pa.	**25.00**	**24.50**	**26.00**	**25.50**	.....	.....	
Steelton, Pa.	.....	**24.50**	.....	.....	**$29.50**	.....	
Birdsboro, Pa.	**25.00**	**24.50**	**26.00**	**25.50**	**29.50**	.....	
Sparrows Point, Md.	**25.00**	**24.50**	.....	.....	.....	.....	
Erie, Pa.	**24.00**	**23.50**	**25.00**	**24.50**	.....	.....	
Neville Island, Pa.	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....	
Sharpsville, Pa.*	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....	
Buffalo	**24.00**	**23.00**	**25.00**	**24.50**	**29.50**	.....	
Cincinnati	24.44	24.61	.....	25.11	.....	.....	
Canton, Ohio	25.39	24.89	25.89	25.39	.....	.....	
Mansfield, Ohio	25.94	25.44	26.44	25.94	.....	.....	
St. Louis	24.50	24.02	.....	.....	.....	.....	
Chicago	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....	$31.34
Granite City, Ill.	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....	
Cleveland	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....	
Hamilton, Ohio	**24.00**	**23.50**	.....	**24.00**	.....	.....	
Toledo	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....	
Youngstown*	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....	
Detroit	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....	
Lake Superior fc.	.....	.....	.....	.....	.....	**$28.00**	
Lyles, Tenn. fc.†	.....	.....	.....	.....	.....	**33.00**	
St. Paul	26.63	.....	27.13	26.63	.....	.....	
Duluth	**24.50**	.....	**25.00**	**24.50**	.....	.....	
Birmingham	**20.38**	**19.00**	**25.00**	.....	.....	.....	
Los Angeles	27.50	.....	.....	.....	.....	.....	
San Francisco	27.50	.....	.....	.....	.....	.....	
Seattle	27.50	.....	.....	.....	.....	.....	
Provo, Utah	**22.00**	.....	.....	.....	.....	.....	
Montreal	27.50	27.50	.....	28.00	.....	.....	
Toronto	25.50	25.50	.....	26.00	.....	.....	

GRAY FORGE IRON

Valley or Pittsburgh furnace..... **$23.50**

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade (1.75 per cent to 2.25 per cent).

Phosphorous Differential: Basing point prices are subject to a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over.

† Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

Manganese Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.50 per cent manganese content in excess of 1.00 per cent.

WAREHOUSE PRICES

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.35	$3.05	$3.35	$3.75	$3.58	$3.43	$3.25	$3.71	$3.45	$3.39	$3.30	$3.38	$5.10
Sheets, cold rolled	....	4.10	4.05	4.05	4.60	4.30	4.30	3.68	....	4.24	4.35	4.23	7.30
Sheets, galvanized	4.65	4.60	4.75	5.00	5.00	4.84	4.75	5.11	4.75	4.99	4.75	4.98	6.30
Strip, hot rolled	3.60	3.40	3.50	3.95	3.96	3.68*	3.82	4.06	3.70	3.74	3.65	3.73	....
Strip, cold rolled	3.20	3.30	3.20	3.31	3.51	3.40	3.52	3.46	....	3.61	3.83	3.54	....
Plates	3.40	3.55	3.40	3.75	3.76	3.60	3.62	3.85	3.55	3.69	3.80	3.68	4.95
Structural shapes	3.40	3.55	3.58	3.75	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.95
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.64	3.75	3.63	**4.15
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.45	7.10	7.55	7.31	7.60	7.67	7.35	7.50	....	7.72	7.45	7.58	10.35
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	9.35
Bars, cd. drn. SAE 2300	8.40	8.15	8.40	8.56	8.84	8.70	8.40	8.63	....	8.77	8.84	8.63	11.35
Bars, cd. drn. SAE 3100	6.75	6.75	7.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6.98	10.35

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions; Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb., cold rolled strips, 0.0971 in. thick; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb., cold rolled strip 0.095 in. and lighter; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 24 ga.—1 to 1499 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.43. **Over 4 in. wide and over 1 in. thick, $4.95.

CORROSION AND HEAT-RESISTING STEELS

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.73c.	16.15c.	19.13c.	23.38c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hotstrip	17.00c.	17.50c.	24.00c.	25.00c.
Cold st.	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
*Motor	4.95c.
*Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 75c. per 100 lb.

*In some instances motor grade is referred to as dynamo grade and dynamo grade is referred to as dynamo special.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, per Package of 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and Carriage Bolts:

6 ½ in., shorter and smaller	65½
6 x ⅝ in., and shorter	63½
6 in. by ¾ to 1 in. and shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:

(hexagon or square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	71 and 10
Stove bolts in packages, with nuts attached	71
Stove bolts in bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

Base per 100 Lb.

F.o.b Pittsburgh, Cleveland, Chicago, Birmingham $3.75

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ..... 65 and 5

Cap and Set Screws

Per Cent Off List

Upset hex. head cap screws U.S.S. or S.A.E. thread, 1 in. and smaller	60
Upset set screws, cup and oval points	68
Milled studs	40
Flat head cap screws, listed sizes	30
Filister head cap, listed sizes	46

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

WIRE PRODUCTS

(To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

Base per Keg

Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85

Base per 100 Lb.

Annealed fence wire	$3.05

Base Column

Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes.

Minimum Wall

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
	$	$	$
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)

Base Price = $200 Per Net Ton

Steel (Butt Weld)

	Black	Galv.
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½

Wrought Iron (Butt Weld)

½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Steel (Lap Weld)

2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½

Wrought Iron (Lap Weld)

2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17

Steel (Butt, extra strong, plain ends)

	Black	Galv.
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57

Wrought Iron (Same as Above)

½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

Steel (Lap, extra strong, plain ends)

2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56

Wrought Iron (Same as above)

2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.

FUEL OIL

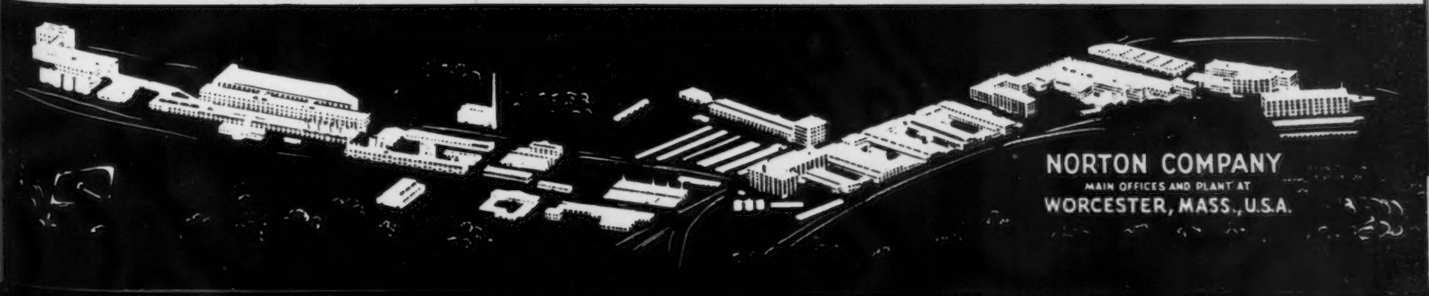
No. 3, f.o.b. Bayonne, N. J.	4.90c.
No. 6, f.o.b. Bayonne, N. J.	3.21c.
No. 6 Bur. Stds., del'd Chicago	2.75c.
No. 3 distillate del'd Cleveland	6.25c.
No. 4 indus., del'd Cleveland	5.75c.
No. 6 indus., del'd Cleveland	5.00c.

GRINDING WHEEL PRODUCTION
Hitting on HIGH!

IN 1920 Norton built the first tunnel kiln in the abrasive industry, three more in 1928, 1936 and 1937. The fifth, just completed, will be fired this month.

The greatly increased kiln capacity and additional manufacturing facilities were ready in time to help meet the increasing grinding wheel demands of the defense industries.

NORTON ABRASIVES



NORTON COMPANY
MAIN OFFICES AND PLANT AT
WORCESTER, MASS., U.S.A.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans, Domestic, 80%, per gross ton (carloads)...$120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....$36.00
Domestic, 26 to 28%..... 49.50

Electric Ferrosilicon

(Per Gross Ton, Delivered Lump Size)

50% (carload lots, bulk).....$74.50*
50% (ton lots, packed)..... 87.00*
75% (carload, lots, bulk).....135.00*
75% (ton lots, packed).....151.00*

Bessemer Ferrosilicon

(Per Gross Ton, F.o.b. Jackson, Ohio)

10.00 to 10.50 .....$34.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

(Per Gross Ton, Base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio.....$29.50*
Buffalo $30.75*

For each additional 0.5% silicon up to 11.5%, $1 a ton is added.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

*Official OPACS price.

Ferrochrome

(Per Lb. Contained Cr, Delivered Carlots, Lump Size, on Contract)

4 to 6 carbon .....11.00c.
2 carbon .....17.50c.
1 carbon .....18.50c.
0.10 carbon .....20.50c.
0.06 carbon .....21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

(Per Gross Ton, Delivered, Lump Size, Bulk, on Contract)

3 carbon $113.00*
2.50 carbon 118.00*
2 carbon 123.00*
1 carbon 133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del'd carload..... $2.00
Ferrotungsten, 100 lb. and less $2.25
Ferrovanadium, contract, per lb. contained V, del'd $2.70 to $2.90†
Ferrocolumbium, per lb. contained Cb, f.o.b. Niagara Falls, N. Y., ton lots..... $2.25†
Ferrocarbontitanium, 15-18 Ti, 7-8 C, f.o.b. furnace, carload, contract, net ton.....$142.50
Ferrocarbontitanium, 17-20 Ti, 3-5 C, f.o.b. furnace, carload, contract, net ton.....$157.50
Ferrophosphorus, electric or blast furnace material, carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage freight, equalized with Rockdale, Tenn., gross ton..... $58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsato (Siglo), Tenn., $3 unitage, freight equalized with Nashville, gross ton..... $75.00
Ferromolybdenum, per lb. Mo, f.o.b. furnace ..... 95c.
Calcium molybdate, per lb. Mo, f.o.b. furnace..... 80c.
Molybdenum oxide briquettes 48-52 Mo, per lb. contained Mo, f.o.b. Langeloth, Pa.... 80c.
Molybdenum oxide, in cans, per lb. contained Mo, f.o.b. Washington, Pa. ..... 80c.

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores (51.50% Fe.)

(Delivered Lower Lake Ports)

Per Gross Ton

Old range, bessemer, 51.50.... $4.75
Old range, non-bessemer, 51.50 4.60
Mesaba, bessemer, 51.50..... 4.60
Mesaba, non-bessemer, 51.50... 4.45
High phosphorus, 51.50..... 4.35

Foreign Ores*

(C.i.f. Philadelphia or Baltimore, Exclusive of Duty)

Per Unit

African, Indian, 44-48 Mn..65c. to 66c.
African, Indian, 49-51 Mn..67c. to 69c.
Brazilian, 46-48 Mn.....65c.
Cuban, del'd, 51 Mn .....79c. to 81c.

Per Short Ton Unit

Tungsten, Chinese Wolframite, duty paid, delivered.....$24 to $26
Tungsten, domestic scheelite, at mine $24.00
Chrome ore, lump, c.i.f. Atlantic Seaboard, per gross ton; South African (low grade).....Nom.
Rhodesian, 45 .....$32.00
Rhodesian, 48 .....$39.00-$40.00

*Importations no longer readily available. Prices shown are nominal.

COKE

Furnace *Per Net Ton*

Connellsville, prompt ...$6.00 to $6.25

Foundry

Connellsville, prompt ...$6.75 to $7.00
By-product, Chicago $10.50
By-product, New England.....$13.75
By-product, Newark..$12.40 to $12.95
By-product, Philadelphia $12.13
By-product, Cleveland $12.30
By-product, Cincinnati $11.75
By-product, Birmingham $8.50
By-product, St. Louis.$10.75 to $11.00

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., gross ton $40.00
Angle bars, 100 lb. 2.70

(F.o.b. Basing Points) *Per Gross Ton*

Light rails (from billets).....$40.00
Light rails (from rail steel)... 39.00

Base per Lb.

Cut spikes ..... 3.00c.
Screw spikes ..... 5.15c.
Tie plates, steel ..... 2.15c.
Tie plates, Pacific Coast ..... 2.30c.
Track bolts, heat treated, to railroads ..... 5.00c.
Track bolts, jobbers discount.. 63-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail.....$22.00 to $23.00
Domestic, f.o.b. Ohio River landing barges ..... 22.00 to 23.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines..22.00 to 23.00
Foreign, 85% calcium fluoride, not over 5% Si, c.i.f. Atlantic ports, duty paid.....Nominal
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines.... 31.00
As above, in bags, f.o.b. same mines 32.60

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick *Per 1000*

Super-duty brick, St. Louis...$64.60
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois 51.30
First quality, New Jersey..... 56.00
Second quality, Pennsylvania, Maryland, Kentucky, Missouri, and Illinois 46.55
Second quality, New Jersey..... 51.00
No. 1, Ohio 43.00
Ground fire clay, net ton..... 7.60

Silica Brick

Pennsylvania $51.30
Chicago District 58.90
Birmingham 51.30
Silica cement, net ton (Eastern) 9.00

Chrome Brick *Per Net Ton*

Standard, f.o.b. Baltimore, Plymouth Meeting and Chester...$54.00
Chemically bonded, f.o.b. Baltimore, Plymouth Meeting and Chester, Pa. 54.00

Magnesite Brick

Standard f.o.b. Baltimore and Chester $76.00
Chemically bonded, f.o.b. Baltimore 65.00

Grain Magnesite

Domestic, f.o.b. Baltimore and Chester in sacks $44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk) 22.00

WHAT THE WELL-DRESSED FOWL WILL WEAR

Skewers, such as those in the roast below, are but one of the hundreds of ways Continental SUPERIOR wire may be used in the manufacture of everyday items. Continental wire is produced in sizes from 34 gauge to 5/8-inch . . . and in correct analyses, tempers and coatings to fill exacting requirements and improve products.

CONTINENTAL STEEL CORPORATION ★ SUPERIOR WIRE

WIRE FOR A THOUSAND USES

SKEWERS may be a far cry from the product you manufacture, but they illustrate the adaptability of Continental SUPERIOR Wire to the job at hand. The different combinations of sizes, shapes and finishes available in Continental wire are numbered in thousands.

Whenever you have a problem that calls for a special shape of wire or wire for some unusual fabricating job, call on Continental. It is our business to provide you with the exact type of wire that will assure you smoother, faster production.

CONTINENTAL STEEL CORP., KOKOMO, INDIANA

(The Superior Sheet Steel Co., Canton, Ohio—a subsidiary)

CONTINENTAL STEEL CORPORATION

SHEETS: Black, Galvanized, Copperior, Hot and Cold Rolled, Special Coated, Long Terne, etc.

WIRE: Bright Basic, Annealed, KONIK, Copperad, Tinned, Special Manufacturer's, etc.

SALES POSSIBILITIES

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic States

● **South Portland Ship Building Corp.**, South Portland, Me., has let general contract to E. C. Snodgrass, 169 Front Street, for five additions, consisting of one-story assembling works, 75 x 475 ft.; one-story welding works, 15 x 42 ft.; one-story gate house, 21 x 25 ft.; one-story storage and distributing building, 75 x 450 ft.; and two-story administration building, 30 x 55 ft. Cost more than $350,000 with equipment. A. J. Harriman is engineer.

Bullard Co., Bridgeport, Conn., plans expansion in machine tool works for production of machine tools for government and will secure fund of $1,600,000 through Defense Plant Corp., Washington, for purchase of machinery and equipment.

E. H. Jacobs Mfg. Co., Danielson, Conn., textile mill equipment, loom pickers, etc., has acquired 16-acre tract near Charlotte, N. C., as site for new plant, supplementing present local branch works on Dowd Road. Initial plant will comprise two one-story buildings, each about 10,000 sq. ft. of floor space, for manufacturing division, and storage and distribution, respectively. Cost close to $45,000 with equipment. Other structures will be erected at later date. Louis H. Asbury, Charlotte, is architect.

Fafnir Bearing Co., New Britain, Conn., ball bearings, transmission equipment, etc., plans expansion in plant for production of aircraft parts for government, and will install tools and machinery to cost about $746,000. Fund in that amount is being provided by Defense Plant Corp., Washington.

Commercial Solvents Corp., 17 East Forty-second Street, New York, commercial alcohol, industrial chemicals, solvents, etc., has concluded arrangements with War Department, Washington, for construction and operation of new plant at Sterlington, La., for production of synthetic ammonia. It will be located in vicinity of works of Thermatomic Carbon Co., subsidiary interest, and will comprise several large one and multi-story units, with power station, machine shop, storage and distributing buildings and auxiliary structures. Cost about $9,250,000 for land, buildings and machinery, with fund in that amount to be provided by Defense Plant Corp., Washington. Work will begin soon.

Phelps Dodge Copper Products Corp., 40 Wall Street, New York, wire, cable, rods, etc., has let general contract to Brown & Matthews, Inc., 122 East Forty-second Street, for one-story addition to branch plant at 43-09 Fifty-fifth Drive, Long Island City, operated in name of Phelps Dodge Refining Corp., for expansion in furnace division. Cost close to $175,000 with equipment.

American Aniline Products, Inc., 50 Union Square East, New York, industrial chemicals, colors, dyes, etc., plans expansion in plant at Lock Haven, Pa., including one-story addition to processing department; new power house with installation of turbine-generator unit, boiler and auxiliary equipment; top story addition to present one-story office building, and other work. Cost over $300,000 with equipment.

Standard Brands, Inc., 595 Madison Avenue, New York, food products, has let general contract to Inge Construction Co., 2326 North Beckley Street, Dallas, Tex., for new branch plant for Fleischmann Yeast Division at Maple and Amelia Streets, Dallas, comprising group of eight one, two and four-story structures. Cost close to $900,000 with equipment.

Jamestown Metal Corp., Jamestown, N. Y., hollow metal doors, metal trim and kindred products, has leased plant of Henry Sheet Steel Service Corp., 215-17 Hopkins Avenue, about 16,000 sq. ft. of floor space, and will use for expansion, retaining certain present equipment and providing additional machinery.

Exolon Co., Blasdell, N. Y., silicon carbide abrasives and allied products, plans rebuilding of plant recently destroyed by fire, including several large production units, inspection building, engine house, laboratory and miscellaneous structures. Loss more than $125,000 with equipment.

DeLaval Steam Turbine Co., 853 Nottingham Way, Trenton, N. J., turbines, compressors, pumps, etc., plans expansion in plant for production of turbines and gears for merchant vessels for government, including one-story extension and installation of machinery to cost about $1,250,000. Fund in that amount will be provided by Defense Plant Corp., Washington, for project.

Nesor Alloy Products Co., 46 Green Street, Newark, N. J., wire products for aeronautical and automotive service, has leased three-story building at 282-84 Halsey Street, and will equip and occupy for expansion.

Lawrance Engineering & Research Corp., Vreeland Mills Road, Linden, N. J., power plant specialties, diesel engine units, etc., plans new one-story plant on neighboring site for production of aircraft equipment for government. Cost estimated at $663,000 with machinery. Fund in that amount will be secured through Defense Plant Corp., Washington, for project.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until Sept. 2 for quantity of steel drills, tool blades, slitting saws, side milling cutters, etc. (Circular 297).

General Chemical Co., 40 Rector Street, New York, industrial chemicals, plans one-story addition to branch plant on River Road, Edgewater, N. J. Cost more than $125,000 with equipment. United Engineers & Constructors, Inc., 1401 Arch Street, Philadelphia, is architect and engineer.

National Youth Administration, 2145 C Street, N. W., Washington, plans one-story mechanical and general crafts shop, 55 x 140 ft., with extension, 20 x 140 ft., at Wilkes-Barre, Pa., including machine and welding departments, and woodworking shops. A boiler house will be built. Cost close to $125,000 with equipment.

J. A. Zurn Mfg. Co., Pittsburgh Avenue, Erie, Pa., plumbing and drainage products, has approved plans for one-story addition, including foundry unit. Cost about $75,000 with equipment. Company has acquired marine plumbing division of A. B. Sands & Sons Co., Middletown, Conn., an interest of Wilcox, Crittenden & Co., same place, and will remove to Erie to occupy new structure, where expansion will be carried out.

Kendall Refining Co., Bradford, Pa., oil products, has acquired at public sale on bid of $305,500, former local oil refining plant of Foster Brook Oil Refining Co., consisting of several large production units, with tanks and other facilities, and will improve and equip for expansion, particularly for production of specialty oils, storage and distribution.

War Department, Washington, plans new storage depot at Marietta, Pa., including six main buildings, about 2,000,000 sq. ft. of floor space, for storage and distribution, machine and mechanical shops, and other structures. Cost estimated at $5,044,000 with equipment.

Public Works Officer, Naval Academy, Annapolis, Md., asks bids until Sept. 3 for extension to local water-softening plant, including two 1000-gal. per min. capacity pumping units and piping; water softeners and pressure filters, with piping; and 12-in. suction line from reservoir to pumps in power house (Specifications 10488).

Potomac Electric Power Co., Tenth and E Streets, N. W., Washington, is arranging fund of about $10,000,000 for expansion and improvements in power plants and system in 1942, including station equipment for increased capacity, transmission and distributing lines, power substations and other operating structures and facilities. A similar amount is proposed in 1943 for like purpose.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 2 for one hydraulic forming press, 1000-ton capacity (Schedule 8384), one motor-driven shaft-straightening press, hydraulic type, 400-ton capacity (Schedule 8365) for Western navy yards.

Norwich, Conn., has appropriated $300,000 for a site and a trade school of mill construction having 50,000 sq. ft. floor space.

James Hunter Machine Co., 2 Main Street, North Adams, Mass., has awarded a contract to the Aberthaw Co., 80 Federal St., Boston, for a two-story, 130 x 40 ft., building No. 4 addition.

The South

● **Ingalls Shipbuilding Corp.**, 720 Fourth Avenue South, Birmingham, plans expansion in shipyard at Pascagoula, Miss., including two new shipways, three outfitting docks, shops, storage and distributing buildings, and other structures, to be used for construction of vessels for U. S. Maritime Commission, as well as submarine net layers and other Federal ships. Cost more than $3,000,000 with equipment. Company is affiliated with Ingalls Iron Works Co., first noted address.

United States Engineer Office, Federal Building, Louisville, asks bids until Sept. 9 for quantity of wickets, horses and props in three lots, totaling about 166 castings in all, for repairs for Ohio River dams.

Southern Cotton Oil Co., Canal Bank Building, New Orleans, cottonseed oil products, plans rebuilding of portion of branch mill at Fayetteville, N. C., used for soybean processing and other manufacture, recently destroyed by fire. Loss close to $100,000 with equipment.

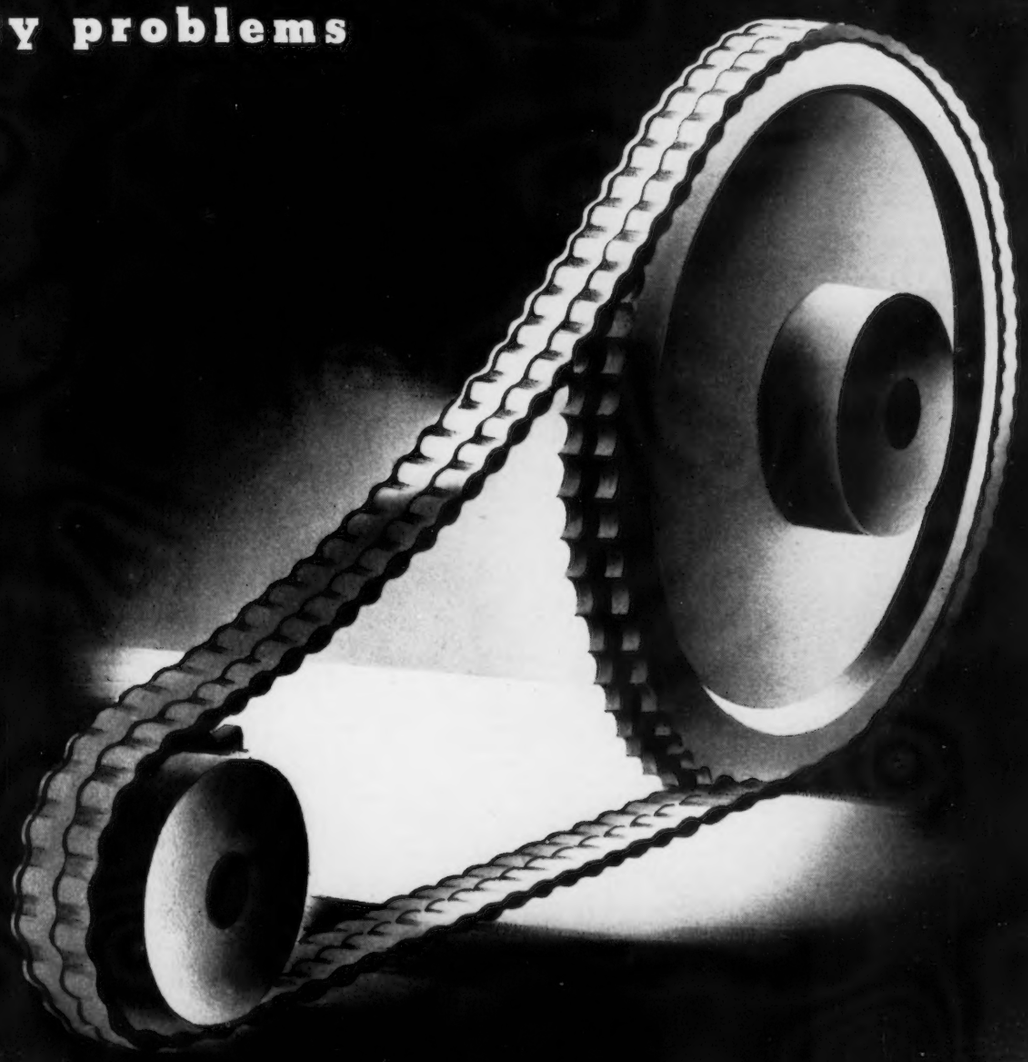
Department of Utilities and Finance, Alexandria, La., W. A. McLean, commissioner, plans expansion and improvements in municipal power plant, including installation of equipment for increased capacity. Cost about $275,000. Financing will be arranged through Federal aid.

Dow Chemical Co., Midland, Mich., industrial chemicals, magnesium, etc., has let contract to Austin Co., 16112 Euclid Avenue, Cleveland, and M. W. Kellogg Co., 225 Broadway, New York, for design and construction of new plant on 4500-acre tract in vicinity of present magnesium works at Freeport, Tex., for production of synthetic ammonia for government. It will comprise several large one and multi-story units, equipped for capacity of about 150 tons per day, with storage and distributing structures, machine and mechanical shops, tanks, power station and other facilities. Natural gas will be used as a base material for production. Cost about $11,000,000, and fund in that amount will be provided by Defense Plant Corp., Washington, for project.

Brownsville Shipbuilding Corp., S. Finley Ewing, First National Bank Building, Harlingen, Tex., president, recently organized, has let general contract to Archer & Holding Co., Marine Arcade Building, Brownsville, Tex., for new shipyard at turning basin at local port. Work will comprise several shipways, outfitting docks, machine and mechanical shops, pipe shop, storage and distributing buildings, power station, office building and miscellaneous structures. Cost reported more than $2,000,000.

Texas Steel Co., 3909 Hemphill Street, Fort Worth, Tex., oil well equipment and supplies, steel castings, etc., has plans maturing for new plant on 250-acre tract on Intracostal Canal, Port Arthur, Tex., for production of shell forgings and shell cases for government, comprising several large one and multi-story units, with power house and other auxiliary structures. Cost about $1,000,000 with equipment. H. E. Beyster Corp., General Motors

Cast Chromium-Molybdenum steel offers a simple, economical solution to knotty problems



Flame hardened Chromium-Molybdenum Steel (1.00% Cr-0.40%-Mo.) has simplified the manufacture of high grade drive sprockets for heavy duty hoisting machines.

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Building, Detroit, is consulting engineer. Company also has work under way on expansion at Fort Worth for production of similar products of smaller size, likewise for government, including new shop units and equipment, reported to cost more than $350,000.

Central States

● **National Acme Co.,** East 131st Street and Coit Road, Cleveland, automatic screw machines and screw machine products, plans one-story addition for production of machine tools for government. Cost about $300,000 exclusive of equipment, with cost to be defrayed by company; machinery and equipment is estimated to cost $488,000 and fund in that amount will be furnished by Defense Plant Corp., Washington, as recently announced, for such purpose.

United States Engineer Office, Post Office and Court House, Cincinnati, asks bids (no closing date stated) for Mill Creek pumping station and appurtenant works, Contract No. 2, Cincinnati, including traveling crane, steel conduits and fittings, cast steel, piping, etc. (Circular 15).

Basic Refractories, Inc., Hanna Building, Cleveland, high-temperature refractories, etc., has closed agreement with government for construction and operation of new plant near Las Vegas, Nev., for production of metallic magnesium and other magnesium products for War Department. Plant will be built in series of 10 production units, each to comprise several one and multi-story buildings, equipped for output of about 11,200,000 lbs. per annum, making total of 112,000,000 lbs. per year for ultimate plant; also machine and mechanical shops, large power substation and miscellaneous operating structures. Power supply will be secured from Boulder Dam hydroelectric generating station of government, Boulder Canyon, Nev., with construction of transmission line to plant site. Entire project will cost about $63,000,000, to be furnished by Defense Plant Corp., Washington, which will retain title to plant and property. Magnesite deposits in Nye County, Nev., now held by company, will be developed for raw material supply. Basic Magnesium, Inc., is being organized as a subsidiary interest to carry out project.

McDonnell Aircraft Corp., Lambert-St. Louis Municipal Airport, St. Louis, airplanes and parts, has arranged contract with government for construction and operation of one-story plant, using part of adjoining tract of about 87 acres, acquired by War Department for present and future plants. It will consist of a main one-story unit and several auxiliary structures, to be equipped for production of aircraft parts. Cost about $532,500 for buildings and machinery, with fund in that amount to be furnished by government. Work will begin soon.

Ford Motor Co., Dearborn, Mich., has let general contract to Esslinger-Misch Co., 159 East Columbia Street, Detroit, for four-story addition, 360 x 400 ft., for expansion in aircraft engine plant for production for government. Cost close to $1,000,000 with equipment. Giffels & Vallet, Inc., Marquette Building, Detroit, is architect and engineer.

Firestone Rubber & Metal Products Co., Wyandotte, Mich., a subsidiary of Firestone Tire & Rubber Co., Akron, Ohio, has let general contract to J. A. Utley, 723 East Ten-Mile Road, Detroit, for one-story addition, 220 x 360 ft., for storage and distribution. Cost close to $200,000 with equipment. Russell Engineering Corp., 607 Shelby Street, Detroit, is engineer.

Water and Light Department, Lansing, Mich., Otto Eckert, superintendent, plans expansion in municipal power plant, including installation of new 25,000-kw. turbine-generator unit and accessories, boiler and auxiliary equipment. Also will make extensions in transmission and distributing lines, with additional service facilities. Entire project will cost close to $3,000,000. Work is scheduled to begin this fall.

Hollup Corp., Division of National Cylinder Gas Co., 2257 West Forty-seventh Place, Chicago, welding rods and kindred equipment, will begin superstructure soon for new one-story plant, about 100,000 sq. ft. of floor space, for which general contract has been let to Campbell-Lowrie-Lautermilch Corp., 400 West Madison Street. It will be located on four-acre tract at 4700 West Nineteenth Street, recently purchased by parent company. Present plant at first noted location has been sold and works will be removed to new plant, where large increased capacity will be developed. A part of new structure will be occupied by Torchweld Equipment Division of company, 1035 West Lake Street, acetylene welding apparatus, which will remove there. Cost more than $200,000 with equipment. Completion is scheduled in November.

Purchasing and Contracting Officer, Quartermaster Corps, Camp Grand, Rockford, Ill., asks bids until Sept. 9 for stokers and auxiliary equipment for power house (Circular 342-7).

M. B. Austin Co., 108 South Desplaines Street, Chicago, electrical conduits and other electrical products, has asked bids in general contract for new one and two-story plant in Northbrook section, about 100 x 160 ft. Cost close to $80,000 with equipment. Morton L. Pereira & Associates, 100 West Monroe Street, are architects.

Kurth Malting Co., West Burnham and South Forty-third Streets, West Milwaukee, malt products, has asked bids on general contract for five-story addition, 55 x 115 ft. Cost more than $125,000 with equipment. Lawrence E. Peterson, 312 East Wisconsin Avenue, Milwaukee, is engineer.

Allis-Chalmers Mfg. Co., Milwaukee, has closed agreement with government for construction and operation of new plant for production of airplane bomber equipment, on site at Greenfield, Wis., where tract has been acquired. It will comprise group of one and multi-story buildings, with boiler plant and auxiliary structures. Cost estimated at $9,066,964, of which approximately $4,961,525 will be expended for machinery and equipment, the remainder for land and buildings. Appropriation will be provided by Defense Plant Corp., Washington, for project.

Rath Packing Co., Waterloo, Iowa, meat packer, has asked bids on general contract for two additions, one and multi-story, for expansion in present units Nos. 117 and 162. Cost reported more than $100,000 with equipment. Henschien, Everds & Crombie, 59 East Van Buren Street, are architects and engineers.

Western States

● **Bureau of Reclamation,** Denver, Colo., asks bids until Sept. 8 for one 75,000-kva., vertical-shaft electric generating unit and auxiliary equipment, for installation in Shasta hydroelectric power station, Central Valley project, Cal. (Specifications 984).

Vega Airplane Co., 2555 North Hollywood Way, Burbank, Cal., aircraft and parts, plans several one-story additions, including two hangars, storage and distributing building, office structure and other units. Cost reported more than $100,000 with equipment.

Isaacson Iron Works, Inc., 2917 East Marginal Way, Seattle, marine forgings, automobile bodies, etc., has acquired tract of about four acres in Duwamish Waterway district, as site for new plant for production of forgings for government. It will comprise several large one-story buildings, with auxiliary structures, power station and shops. Cost about $2,600,000 with equipment. Appropriation in that amount will be furnished by Defense Plant Corp., Washington, for project. At later date it is proposed to carry out expansion, with additional buildings and equipment to cost close to $1,000,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 2 for four electrically-heated impregnating units, complete with pump, equipment, tools and wrenches and spare parts (Schedule 8360), quantity of electric cable (Schedule 8357) for Mare Island navy yard, Vallejo, Cal., and Puget Sound yard, Bremerton, Wash.; one motor-driven universal shaper (Schedule 8361) for San Pedro, Los Angeles yard; one motor-driven automatic thread-grinding machine, for external and internal grinding (Schedule 8374) for Keyport, Wash., yard.

Canada

● **North Vancouver Ship Repairs, Ltd.,** North Vancouver, B. C., plans expansion in shipyard, including new floating drydock, shops and miscellaneous buildings. Cost close to $700,000 with equipment.

Atlas Steels, Ltd., Main Street, Welland, Ont., has begun erection of one-story addition, 100 x 575 ft., for which general contract recently was let to Standard Steel Construction Co., Port Robinson, Ont. It will be used for finishing service. Cost more than $200,000 with equipment.

St. John Dry Dock & Shipbuilding Co., Ltd., St. John, N. B., has awarded contract to Canadian Dredge & Dock Co., for addition and alterations to plant at East St. John, to cost $200,000.

Department of Munitions and Supply, Ottawa, Ont., G. K. Sheils, deputy Minister, has called tenders for additional buildings for airplane repair depot at Trenton, Ont., to cost, with equipment, about $250,000.

Canadian International Paper Co., Ltd., 1155 Metcalfe Street, Montreal, plans additions to coal handling equipment, and other changes to plant at Three Rivers, Que., to cost, with equipment, $370,000.

James MacLaren Co., Ltd., Buckingham, Que., newsprint paper, has awarded contract to Foundation Co. of Canada, Ltd., 1538 Sherbrooke Street West, Montreal, for plant and equipment enlargements representing expenditure of $2,000,000. The work will include two dams; new buildings with equipment to cost $500,000.

General Motors of Canada, Ltd., William Street, Oshawa, Ont., will start work soon on plant addition, one-story, 160 x 200 feet, to cost with equipment, about $250,000.

Sorg Pulp Co., Ltd., Vancouver, B. C., will build plant addition at Port Mellon, B. C., to cost with equipment, $100,000.

Singer Mfg. Co., Ltd., St. Johns, Que., sewing machines, power tables, war supplies, etc., will build two plant additions to cost, with equipment, about $220,000. J. P. Traham, 178 Mercer Street, has general contract.

Standard Cycle Products, Ltd., 407 Logan Avenue, Toronto, Ont., bicycles, tricycles, etc., plans erection of one-story, 100 x 180 foot, plant to cost, with equipment, about $75,000.

National Steel Car Corp., Ltd., Hamilton, Ont., has awarded general contract to Gratton Construction Co., 486 Clinton Street, Toronto, and structural steel to Dominion Bridge Co., Ltd., 1139 Shaw Street, Toronto, in connection with addition to aircraft plant at Malton, Ont., to cost about $250,000 with equipment.

Department of Munitions and Supply, Ottawa, Ont., G. K. Sheils, deputy Minister, has awarded general contract to Atlas Construction Co., Ltd., 679 Belmont Street, Montreal, for erection of buildings in Quebec for war materials production to cost $1,025,000, equipment extra.

Distillers Corp., Ltd., 1430 Peel Street, Montreal, Que., has awarded contract to A. F. Byers & Co., Ltd., 1226 University Street, Montreal, for $250,000 addition to plant on Lafleur Street, Ville LaSalle, Que.

Vancouver General Hospital, 10th Ave., and Heather Street, Vancouver, B. C., is planning hospital addition to cost $400,000, to be of reinforced concrete, 4 stories, 135 x 160 ft. Townley & Matheson, 325 Homer Street are architects.

Canadian Durex Abrasives, Ltd., 154 Pearl Street, Toronto, Ont., abrasive supplies, is planning erection of plant addition at Brantford, Ont., to cost, with equipment, about $300,000.